677·4
Raw/sil
143786

Digitized with financial assistance from
Hermès India
a project facilitated by the Rotary Club of Bombay

on 10 August, 2018

THE SILK INDUSTRY AND TRADE

ASIATIC SOCIETY OF BOMBAY
Presented by:-
.. ..
....
Date.....

THE SILK INDUSTRY AND TRADE

A Study in the Economic Organization of the Export Trade of Kashmir and Indian Silks, with Special Reference to their Utilization in the British and French Markets

BY

RATAN C. RAWLLEY,
M.A., M.Sc. (Econ.),

CARNEGIE RESEARCH FELLOW
AND INVESTIGATOR IN INDUSTRIAL ECONOMICS

London
P. S. KING & SON, LTD.
2 & 4 GREAT SMITH STREET, WESTMINSTER
1919

PREFACE

THE present volume is intended to be an elementary introduction to my Economics of the Silk Industry. It embodies the results of an inquiry into the organization of the export trade of Kashmir and Indian silks, with special reference to their utilization in Great Britain and France. In undertaking this work, my principal object was to discover the exact requirements of the silk market and to present a general analysis of the facts to the interested parties. In doing this, I have pointed out a new source of supply for the consumer of raw silk and a new outlet for the producer. If India's resources of silk are to be developed on a commercial scale, they must find an outlet. The results of personal investigations outlined in this work clearly show what this outlet ought to be.

The inquiry was conducted mainly on commercial and economic lines, and covered nearly all the principal silk centres in this country and in France. It is gratifying to note that everywhere my investigations met with success, and almost all the manufacturers, merchants and brokers showed great interest in the subject.

I take this opportunity of expressing my thanks to all who helped me in my investigations. I am particularly obliged to Professor Lefroy, whose perfect knowledge of the Indian silk industry I used in formulating the lines of my inquiry. Sir Frank Warner, the then President of the British Silk Association, gave me valuable information with regard to the different aspects of the British silk industry.

During the course of my tour in England and Scotland I visited nearly every silk factory and saw the various

processes of manufacture in order to get an idea of the qualities of raw materials used in making silk fabrics and other silk goods. In this connexion, I have to express my thanks to Mr. J. Wheeldon, Managing Director, Messrs Brockelhurst & Sons, for his kind assistance and the particular interest he took in my mission. I am much indebted to Mr. James Dishley, of Messrs. Sir Thomas and Arthur Wardle, Leek, and Mr. Shorter, of Messrs. Wardle & Davenport, for their valuable help in supplying me with information concerning the Leek Sewing Silks Industry.

My thanks are also due to Mr. Frank Farrell, M.Sc., Managing Director, Messrs. Grout & Co., Yarmouth, and Mr. F. C. Hinde, of Norwich, for showing me the different departments of their factories. Mr. J. Sugden Smith, of Messrs. John Hind & Co., Bradford, took an active part in my investigations and very kindly introduced me to other manufacturers in the Bradford area. Mr. Richard Snow, of Messrs. Windley & Co., Nottingham, gave me useful information regarding the utility and commercial value of Bengal raw silks.

In Scotland, Messrs. W. Anderson & Co. and Messrs. Caldwell Young & Co. furnished me with particulars concerning the requirements of the Scottish silk industry.

In the Spinning Section, I am deeply indebted to Mr. A. J. Solly, of Congleton, and Mr. P. W. Metcalfe, of Messrs. Clayton Murgatroyd & Co., Halifax, for their kind assistance and supply of useful information concerning the utility and commercial value of all kinds of wastes.

With regard to my inquiries in France, I have first to thank the Secretary, Revenue and Statistics Department, India Office, for obtaining special facilities from the French Government through the Foreign Office. His Majesty's Ambassador in Paris was informed of my visit, and the late Sir Henry Austin Lee, Commercial Attaché to the British Embassy, very kindly made all subsequent arrangements for my tour in France. In addition to his kind help, Sir Henry showed great interest in this investigation, which he considered to be of great industrial importance to the silk-producing and silk-manufacturing countries. The

French Government granted all possible facilities for my work and due to this my inquiries met with success.

My special thanks are due to Mr. Edward Vicars, the British Consul General at Lyons, and Monsieur Morel, Vice-President, Lyons Chamber of Commerce, for cordial assistance and valuable help in arranging a special meeting of the Chamber of Commerce and also in introducing me to the leading members of the Lyons silk trade. I have obtained useful information from Mr. Vicar's Annual Reports on The Trade and Commerce of the Consular District of Lyons. I am also indebted to Monsieur Testenoire, who showed me the Lyons Conditioning House, and explained to me the nature of processes involved in the conditioning of silks.

At Marseilles, I received useful information regarding the sale of cocoons and reeling from M. Nicollerat, Director, Messrs. Chabrières Morel & Co., and their expert, M. Burle.

I have to express my thanks to several other members of the British and French silk trades; to so many, indeed, that I am sure I shall be forgiven if I do not quote in full the long list of their names.

I must, however, acknowledge special thanks to the Secretary of the Silk Association of America for kindly allowing me to reproduce two diagrams from the pamphlets issued by the Association. He has also kindly provided me with literature which has been of considerable use to me.

In the final preparation of this work, I have been greatly helped by Professors A. J. Sargent and W. R. Scott, both of whom have always aided me with their counsel and criticism. Mr. A. C. Mason very kindly read the whole of the manuscript before it was sent to the publishers. I offer my hearty thanks to all who have thus assisted me in my work.

In conclusion, I beg to acknowledge my hearty thanks to the Executive Committee of the Carnegie Research Trust and the Secretary of State for India, for their very valuable assistance, without which it would have been impossible for me to carry out my researches.

I have treated the results of my investigations in different

chapters of this book and have divided the subject according to its aspect and importance. In order to make the subject interesting from a practical point of view I have not adhered to the strict economic terminology, for which I hope I shall be excused. I believe that an inquiry conducted on practical lines in Japan and America would be very useful, not only to the Indian silk industry but also to the British silk-manufacturing industry.

R. C. RAWLLEY.

THE LONDON SCHOOL OF ECONOMICS
AND POLITICAL SCIENCE,
CLARE MARKET, W.C.
April, 1918.

INTRODUCTION

It is a well-known fact that silk has now ceased to be exclusively an article of luxury. A rise in the standard of living in almost every civilized country of the world has produced a visible change not only in the form of dress but also in the materials used for that purpose. Some years ago silk was considered to be an article of great value and was meant only for the upper classes of the community, but now, though its value as a textile fibre is still the same, its use is becoming more widely spread than ever before. Silk fabrics are no longer a luxury, they find an important place among other articles of dress and are now used by nearly all classes. This growing demand for silk fabrics naturally creates a demand for raw silk and results in an extension of the silk trade.

In addition to its great utility in fabrics, silk plays a still greater part in medical and electrical sciences. Its strength and elasticity make it particularly suitable for surgical purposes, and as a non-conductor of electricity it surpasses every other fibre used for making electrical cables. Surgery on the one hand and electrical science on the other are both passing through a stage of advancement, and it is, therefore, certain that silk will be used more and more for scientific purposes in the future.

It is evident that the demand for raw silk is rising every year both in the world of art and in the world of science. With every increase in demand there is a corresponding increase in consumption. This increase in consumption is, to a certain extent, balanced by an increase in production. But speaking generally, one may say that the rate of increase in consumption is greater than the rate of increase in pro-

duction. If both continue moving at their present rates, a time will come when supply will be inadequate to demand. It is, therefore, necessary that a constant relationship should be established between consumption and production, and that they should display thereafter an equal rate of progression. But at present the one outpaces the other, and a condition of instability is the result.

Under the present conditions of production of raw silk, we are naturally led to the conclusion that it is important to raise the production and supply of raw silk so as adequately to meet the growing demand. The existing sources of supply should be extended and new sources should be found. The question now arises as to how this can be done.

So far as the present volume is concerned, there is no necessity for a general consideration of the subject. Here we are concerned only with consumption and supply of raw silk and waste silk in Great Britain and France. Our main object is to solve the problem of supply for these two countries and to see how far India can become a new source of supply.

History of the silk trade clearly shows that India has always been a supplier of silk. There is no doubt that India's export trade in raw silk and silk fabrics has considerably declined during the last thirty years or more, but this decline does not imply that her resources of silk are completely exhausted or that there is no possibility of reviving her former trade. If with proper organization and control, production of raw silk can be increased in India, her supplies can also be regulated to meet the demand in foreign markets. The silk industry has existed in India for hundreds of years, and during the period of the East India Company it played a very important part in the European market. From this point of view India cannot be regarded as a new source of supply. What is urgently needed at present is an extension of the area under cultivation and the introduction of scientific and organized lines. This part of the industrial development is fully discussed by Professor Lefroy in his Report. We have now to consider the possibilities of improving and developing the system of commercial organization and to

find out means by which the market for Indian silks may be extended in this country and in France.

The task may appear to be difficult at first, but it may be pointed out that the obstacles involved are not such as to cause alarm or to discourage the enterprise. The modern commercial conditions are, no doubt, complicated, and demand a careful study, but there is a satisfaction in knowing that nearly every commercial problem has a solution. The present problem when reduced to general terms becomes simple and may be put in the following words : India has or can produce certain qualities of raw silks in certain definite quantities. These quantities can be increased if there is a demand for them in the British and French markets. If these quantities are to be exported to those markets, what is the exact nature of the demand, or in other words what are the exact requirements of the silk manufacturing industries of these two countries ? Would these markets be prepared to pay the same prices for Indian silks as for silks imported from other countries, if their needs were properly attended to ? How is the organization of the export trade to be perfected ? And lastly, how far is the spirit of mutual co-operation going to accomplish the work of development ?

These questions imply that there is an immediate necessity for co-operation between the producer and the manufacturer, and that a strong organization is needed to develop the present system of trade. It is of great interest to the producer to know what the manufacturer requires and to the latter to know what the former can produce. An understanding of this nature between these two important parties at once removes the difficulties that arise from unfamiliarity with the conditions of production and consumption.

The object of this book is to show the lines on which a proper system could be developed. The whole subject has been divided into three parts, each dealing with a particular aspect of the problem.

Part I deals with the British silk industry. A picture of the silk industry in England and Scotland has been given to show the nature of its products and to define its main branches. Each branch of the industry has been taken into

consideration with a view to finding out the quality and the kind of the raw material used in it. The weaving branch of the industry has been discussed first, and it has been shown how far Indian raw silks could be introduced into the market to satisfy the demand of the manufacturers. The principal defects found in these silks have been pointed out to indicate the importance of a good raw silk and to show that if these defects were remedied there would be a great demand for these silks in this country. Several outlets have been pointed out for raw silks of comparatively inferior qualities.

The spinning branch of the industry has been explained in detail. A thorough inquiry has been made into the utilization of different kinds of wastes in spinning. Defects, which render Indian wastes useless, in some cases, have been pointed out and improvements have been suggested. It will be interesting to note that the commercial value of Indian wastes could be greatly increased if due attention were paid to their collection and packing.

A chapter has also been devoted to Indian Wild Silks. The possibility of increasing the export of Tasar and Eri has been discussed in this chapter.

Part II deals with the French silk industry. The subject has been treated on practically the same lines as above. The difference lies in the different aspects of the silk industry in France. In addition to weaving and spinning, we have there the production of cocoons and reeling. This opens another channel for Indian cocoons and attracts our attention.

In this section, a description of the Lyons Conditioning House has also been given and various processes of testing and sizing have been briefly explained. The great commercial utility of this institution has been pointed out in order to give an idea of the benefits which the French silk trade derives from it.

Part III deals with the important problems of prices, consumption and commercial organization. This section completes the investigation so far as the present subject is concerned.

An Historical Sketch is added to this book. It illustrates the principal features of Indian export trade in raw silk

from early times. On account of the absence of exact historical data, the early period is only briefly discussed. Particular attention is paid to the period of the East India Company of which the Records and Parliamentary Reports are available in abundance. These papers lay open the causes which led to the downfall of the Indian silk trade, and help a great deal in constructing the basis of the future export trade in silk.

TABLE OF CONTENTS

		PAGE
PREFACE		v
INTRODUCTION		ix
CHAP.	PART I	
I	PRESENT POSITION OF THE BRITISH SILK INDUSTRY	1
II	RAW MATERIAL FOR SILK MANUFACTURES	10
III	RAW SILK	13
IV	USES OF RAW SILK IN DIFFERENT TRADES: GRADES AND SIZES	25
V	WASTE SILK	35
VI	SUGGESTIONS FOR DEGUMMING OF WASTE IN INDIA	48
VII	TASAR WASTE	51
VIII	THE ERI AND MUGA SILKS	56
	PART II	
IX	THE FRENCH SILK INDUSTRY	61
X	UTILITY OF INDIAN RAWS IN FRANCE	74
XI	UTILIZATION OF SILK WASTES IN FRANCE	81
XII	WILD SILKS: POSSIBILITY OF THEIR CONSUMPTION IN FRANCE	87
XIII	SALE OF COCOONS IN FRANCE	89
XIV	MARSEILLES: ORGANIZATION IN A FILATURE	93
XV	LYONS CONDITIONING HOUSE	96

PART III

CHAP.		PAGE
XVI	PRICES	107
XVII	CONSUMPTION	118
XVIII	COMMERCIAL ORGANIZATION	125
	PRELIMINARY	125
	GRADING AND STANDARDIZATION . . .	126
	PACKING AND SHIPPING	131
	DISTRIBUTION	136
	CONTROL OF THE SILK INDUSTRY IN INDIA .	142
	APPENDIX: HISTORICAL SKETCH	145

THE SILK INDUSTRY AND TRADE

PART I

Chapter I

PRESENT POSITION OF THE BRITISH SILK INDUSTRY

A PICTURE of the British silk industry, as it exists, presents several interesting details to the producer of raw silk and in so far would be very illuminating from the Indian point of view. The more or less scattered nature of the industry gives Britain a peculiar position among the silk manufacturing countries of the world. Comparatively speaking, it covers a large area without wholly concentrating itself in any one place. The result of this scattered character of the industry is, that labour is to a small extent highly skilled, but mainly semi-skilled. There is no exact division between different districts as regards manufactures, and the lack of specialized makers of silk machinery brings in another serious handicap which is overcome only by the best equipped firms.

On a general survey, the industry may be divided into three main branches. First is the net silk industry which involves the use of the silk thread as it comes from the cocoons, or in other words, the manufacture of cloth and other silk goods from raw silk. Then comes the spun silk industry, in which silk waste from cocoons and throwing and winding waste is used. Thirdly, there is the artificial silk industry which is growing every year and in which chemically treated vegetable fibre is used.

Spinning is the dominant branch of the British silk industry, and plays a very important part in the employment of

labour and material. As a matter of fact, the enormous development in spinning is due to England's initiative, and other countries have followed the same lines, or introduced processes which were slightly different from the original process.

As already stated, it is very difficult to separate the silk manufacturing area from other industrial areas, or even to draw a line between the area occupied by the spinning industry and the net silk industry. But for purposes of a general description, the best way is to take each area in turn.

For the sake of convenience, I shall divide the total area into three divisions, calling the first the central area, the second the eastern area and the third the lower central.

To start with I shall take the central area in which the industry is practised in a variety of aspects. In this area, Macclesfield has long been a leading centre. It was once very famous for its exquisite productions and for a long time held the highest position in the list of British silk manufactures. It is remarkable to note that even at the present day it retains a good deal of its past reputation. The distinguishing feature of the Macclesfield industry is that it produces a richer quality of goods and owing to its originality of design and the vastness of its enterprise it defeats foreign competition.

There is a small number of firms of silk throwsters and embroiderers in the town, but the majority of firms are those who manufacture handkerchiefs, men's mufflers, general neckwear, silk cloth for ladies' blouses, knitted goods, and other plain silks for shirtings. On account of the high standard of quality, the manufacturers use a very good class of raw silk.

Two enterprising large firms throw their silk within their own premises, and, in addition to other manufactures, utilize their throwing and winding waste by spinning it into yarn for their own purposes as well as for the foreign market.

Another interesting feature of the Macclesfield industry is that there is still a small number of hand-loom weavers who produce a very rich quality of cloth for a specialized market. These weavers contribute to the artistic designs.

which form the basis of the weaving industry, and thus prepare the road for future progress in the art of silk weaving.

Dyeing and finishing of silk fabrics and thrown silks is done by special firms who devote a good deal of attention to the latest scientific methods. In some cases, the large firms have their own plant for finishing their goods, and this makes it difficult to determine the exact number of workers employed in the silk industry in this district.

The industry, on the whole, is well organized, having a corporate body known as The Silk Trade Employers' Association. This body works in the interests of the silk industry and introduces new schemes for improvement whenever necessary.

Bradford holds the second position in the central area, and in some respects is as important as Macclesfield. It is a great centre of the textile industries, and the major part of its industrial activity represents woollen manufacture. It has a great advantage in possessing modern institutes where the progressive elements of art and science are applied to help the spirit of industrialism.

The difficulty of differentiating the silk industry from other textile industries in Bradford arises when we have to estimate its integral value. A large number of firms use raw silk with other fibres such as cotton and wool. This intermixture of various fibres makes the position of the silk industry quite peculiar; though the fact that raw silk is used still remains there.

Three or four firms manufacture a good quality of dress goods and ladies' silken stuffs, for instance crêpes-de-chine, taffetas and other plain silks. One large firm specializes in pile fabrics, such as velvets, plushes, and imitation furs. In addition to this speciality they are engaged in spinning and making sewing silks. On the whole we may say that the consumption of raw silk in Bradford proper is not very large.

South Reddish, near Stockport, in the same area, is now coming to prominence on account of the manufacture of velvets and plushes, a branch of the silk industry which had considerably declined before the war owing to foreign com-

petition. Its importance is now definitely realized, and, in consequence of this revival, large quantities of spun tasar yarn and schappe are used by the manufacturers who produce beautiful goods for home and foreign consumption.

The other two places in the central area are Brighouse and Halifax, which are both important from the point of view of the utilization of silk waste of all kinds. The great spinning industry is widely practised in this district. It involves a number of processes such as degumming, cleaning, combing, and spinning of the broken fibres and waste obtained from reeling houses and throwing mills.

There is a large number of firms engaged in this branch of the British silk industry, mostly concentrated in Brighouse, and a few in Halifax, Meltham and Congleton. The industry absorbs more than ten thousand workpeople, and in some cases, as in Halifax, the spinners use the most modern and specialized machinery for drying and combing purposes, so that the quality of yarn prepared may compete with that of the Continental spun silk.

It will be seen that large quantities of good silk waste of all sorts are used in this area, and on account of the extensive use of spun yarn as raw material for the manufacturing industry, the demand for silk waste in this country is expected to rise every year.

Another factor which makes spinning rather important is the effect of competition—not only with the American, French, Italian and the Swiss spun silks as in the past, but with the Japanese yarns which are improving in quality and have great future prospects in world's market.

Next in importance comes the eastern area which includes the Eastern Counties of Norfolk, Suffolk, and Essex. Norwich and Great Yarmouth are the two famous places in this area. The former is a very ancient seat of the silk industry. Mourning crêpes form the bulk of its manufacture, but in addition to this, light dress goods such as poplins and silk mufflers are also made here.

There is a fairly large consumption of raw silk in this town, and if the adjacent town of Great Yarmouth is taken into consideration, the quantities reach a high total. In the

latter place a well known firm manufactures those beautiful diaphanous fabrics that are highly prized by the leaders of fashion. Crêpe-de-chine, crepoline, ninon and other beautiful silken stuffs are made here. As a matter of fact, the prosperity of the Yarmouth silk industry is due to the enterprise of this firm in widening the scope of goods manufactured. Braintree and Bocking are known for their elaborate silk brocades and velvets for dress and decorative purposes. Sudbury in Suffolk contributes to the list of silk manufactures by producing umbrella silks and hand-loom velvets. Silks for the drapery and hosiery trades are also manufactured here and some high-class decorative and furnishing silks are made by a modern and enterprising silk weaving company. The quality of design and its variety, combined with fine texture brings out some exquisite productions.

The lower central area, which includes Leek, Coventry, Nottingham and Derby, also attracts considerable attention owing to its important share in the British silk industry. Leek plays a specially important part, being the centre for sewing and embroidery silks. There are four very large firms, which, in addition to their varied manufactures of artificial silk, use considerable quantities of pure silk for preparing beautiful embroidery silks, braids, trimmings, etc. There is no doubt that the increasing consumption of artificial silk has proved detrimental to the pure silk industry of Leek ; but still it is satisfactory to know that for particular purposes real silk is essential and irreplaceable.

The dyeing and finishing of manufactured silks is done in Leek by the highly specialized and renowned firm of Messrs. Sir Thomas & Arthur Wardle. Apart from the local demand of this part of the industry, silks from other centres are also sent to Leek to receive the final touches.

The spinning of silk waste is not an important part of the Leek industry, though one or two firms utilize the throwing and winding waste from other factories and supply the local demand. The Leek Spun Silk Company uses a considerable quantity of China, Japan and European waste, but this is the only firm that carries on business in this branch.

Coming to Coventry, we find that the silk industry has

declined a good deal during the last twenty years. This is partly due to the excessive weight of the foreign competition and partly to the decreasing demand for narrow web goods in this country. At present only three or four firms are engaged in the manufacture of hatbands, belts, ties, lace, and ribbons, for which Coventry was once very famous. Pictures woven in silk and other artistic silk productions have all been replaced by cheap foreign articles of the same kind. There are no more of those hand-loom weavers who used to work out beautiful designs in their own houses. Consumption of real silk is therefore very small in Coventry now.

There has been a remarkable progress however in the direction of artificial silk. This has centred itself in Coventry and its production is increasing enormously. The increasing demand for this fibre has ousted real silk in almost every branch of the British silk industry, and Coventry, being the first centre of production of artificial silk, claims the credit of this transition.

Nottingham is another important town in the lower central area. Although there is not a very large consumption of raw silk here, yet the nature of the industry gives it a certain amount of significance. On account of a growing demand for silk hosiery and ladies' veils, the fine quality of Nottingham manufactures is still kept up. The Nottingham lace trade has always won fame, and has successfully competed with the Continental manufacturers. Silk gloves are also made here. For all these purposes a fine quality of silk thread is required, and in so far as Nottingham is a consumer of raw silk, it attracts special attention.

Derby is situated in the same locality and possesses a small silk industry. Before the beginning of this century it had a large throwing industry which supplied the hosiery trade with beautifully thrown silks, but now this is confined to two big firms. Other firms are engaged in the manufacture of silk cords, trimmings, braids, silk coverings, ladies' millinery, silk wire-coverings, etc.

Here again artificial silk has ousted real silk, and as a matter of fact, about 90 per cent. of the trade is now carried

on in artificial silk. Insulating materials for telephone cables and general electrical purposes are also made in Derby; but these involve a very small consumption of raw silk.

In addition to the areas in England mentioned above, the silk manufacturing industry is carried on in some form or other at several small places like Leigh, Taunton, and St. Albans. Tiverton is the only place where 1,600 people are employed in the manufacture of silk nets and goods of a similar kind. At other places near London small quantities of silk are used, but the extent is so small that it is hardly worth mentioning.

With regard to the consumption of raw silk in Scotland, a good deal may be said. Hand-loom weaving is almost extinct in the old districts around Glasgow, but the power-loom has taken its place in the suburbs where one or two manufacturers have seriously taken up the matter.

There are two large silk factories, one at Larkhall and the other at Lochwinnoch, where tapestries, dress goods and gentlemen's mufflers are manufactured. A large variety of designs is produced including some gorgeously and brightly coloured, which serve the purposes of the Eastern markets. Crêpes-de-chine and other finer materials in plain silks are also made for home consumption. Scotland thus contributes to the list of silk exports from the United Kingdom, and at the same time adds to the products of the British silk industry.

One large firm in Glasgow buys large quantities of Asiatic raw silk for throwing purposes. In addition to the local demand, they get orders from other centres in England owing to their reputation in throwing. There are no other places in Scotland where the silk industry is practised systematically or even where there is any appreciable consumption of raw silk.

Considering the entire situation in brief we find that other textile industries are so completely mixed with the silk industry that an exclusive survey is practically impossible. For instance, even at present in some districts of London, there are firms engaged in the manufacture of upholsterers'

trimmings in which a small quantity of silk is used, but which on account of a mixed trade cannot be classed under a definite heading. It is possible, however, to estimate roughly the amount of silk consumed by these small units and then to count them as one separate item for all practical purposes.

Looking at the present position of the British silk industry from an economic point of view, we discover that though its scattered character makes it rather diffused for distribution of the raw material, yet its nature has some interesting features from an industrial point of view. The difficulty of distribution is at once overcome by the modern system of transport in England, but it is only well established firms that get the latest samples of raw silks available in the market. Small manufacturers follow their old tradition of using a particular kind of material which has been used in their firm for years. Thus, the demand for a new kind of raw silk is restricted to large firms only, and the supply remains in the hands of the brokers who do not care to circulate or popularize it widely.

Another important factor which is more or less affected by the scattered nature of the industry is the supply of labour and its reaction on the consumption of the raw material. Before the war the British silk industry employed about 30,000 people, which included male and female labour. There was a decrease of about 10 per cent. of this labour force due to the war, but this to a certain extent was replaced by an increased employment of female labour, so that, generally speaking, the position of the industry as regards labour supply remained unchanged. If the standard of efficiency remains the same, naturally the consumption of the raw material will remain unchanged, but how far this balance is going to keep steady one cannot predict at the present moment. It is obvious, however, that with India's existing supplies of raw silk, or with supplies likely to be forthcoming in the near future, the position of labour in the British silk industry is quite satisfactory. There may be a consideration of future competition in the labour market which would affect the price of labour in the first place and

ultimately determine the quality of raw silk to be used in the future, but we will leave this problem for another chapter.

The increasing use of artificial silk in the British silk market may seem alarming at first sight, but the fact that the properties of real silk are as yet incomparable should remove all grounds for disquietude. At present there is no ground for complaint or for alarm on this account, and it is certain that if India's resources of raw silk are properly worked up they will find a ready market in the British silk trade. There is no doubt that, in order to keep the demand and supply in equilibrium, and to bring about a sound commercial intercourse between the two countries we shall have to consider the exact wants of the manufacturing side and to find out means of improving production on the producing side. Moreover, the modern competition in the manufacture of goods and also in the production of raw material is bound to give healthy impetus to both sides, the result being that " the survival of the fittest " formula will apply to both, and only the best producers on the one hand and the best manufacturers on the other will stand the test of time and competition. In the meantime, the scientific and economic organization of industry will regulate the essential changes required to keep the industry living and prosperous. At all events, it is certain that the condition governing the supply of raw silk in the British market will change considerably after the war, and opportunities will be automatically given to those who hold the best stocks.

Chapter II

RAW MATERIAL FOR SILK MANUFACTURES

AFTER having given a brief description of the British silk industry, the next step is to find out the nature of the raw material used in different kinds of silk manufactures. It has been incidentally pointed out in the last chapter that the industry is not a homogeneous whole, but on the contrary consists of two main branches, each having several subdivisions, and dealing with real silk in some form or other. The difficulty arises when we take each branch separately and inquire into the nature of fibres used for their manufacture. It is necessary, therefore, to know exactly how far the Indian productions can be employed in the British silk manufactures.

In the first place, the net silk industry consumes large quantities of raw material. It produces a variety of goods, each of which serves a particular purpose and is designed for a particular market. Raw silk reeled from the cocoons of the domesticated silkworms is the basis of this branch of the industry. But, in addition to this reeled silk, a small quantity of reeled tasar is also used, though mainly for goods intended for the Eastern market. Net silk or " raw " as it is commonly known is the principal raw material, the great bulk of which is imported from China, Japan, and Italy, only a very small quantity from India at present.

Secondly, we have the spinning industry which depends entirely on " silk waste " which covers all classes of raw silk which are unwindable and altogether unsuited for throwing purposes. This waste includes the broken layers of silk on the outside of cocoons, pierced cocoons unsuitable for reeling purposes, skein waste formed during the process of reeling from the cocoons into hanks; " throwing waste " and also winding waste. All this was formerly considered to be useless, but now it forms raw material for the spinner.

The spinner has also the choice of using the tasar waste

for darker shades of yarns. Large quantities of this class of waste are imported from China and partly from India (Mysore) and is sent to the American market in the shape of spun yarn. Demand for tasar waste as a raw material is increasing owing to the popularity of English sewing silks used in the Oriental countries.

A new form of raw material has been recently introduced into the market by the English spinner. It is known as the Eri silk, and owing to its properties, which will be discussed at length in another chapter, it has a great future specially in the plush trade.

There is a great possibility of introducing hand-reeled Muga silk, produced exclusively in India, to replace China tasar for the better class of goods. But unfortunately, the cost of production at present is so high that it is impossible for the manufacturer to make it pay in the finished commodity. It is difficult to judge its value in the British silk market under the present conditions.

While studying the problem of raw material for the British silk industry, the most important thing to note is the large consumption of silk waste for the preparation of spun yarn which in its turn becomes the raw material for further silk manufactures. Strictly speaking, the supply of raw silk is closely connected with the supply of waste as one depends on the other in so far as the production of the raw material is concerned. The utility of silk waste is governed by the use of raw silk in the manufacturing part of the industry, but apart from that there is a decided advantage in consuming material which is otherwise useless but appears as bright as the real silk when finished for the market.

We have now seen how each branch of the industry employs raw material for its manufactures. It is of interest to the British manufacturer to know that India is capable of producing different varieties of raw material for his purpose, and that by a knowledge of his requirements, India can satisfy the demand of his market. A knowledge of the conditions of the manufacturing industry helps to obviate the difficulties that arise out of commercial ignorance. The quality of the raw material used for each particular purpose

is, therefore, a subject which demands a careful study. The choice of the raw material is moreover the fundamental basis of economy in the silk manufacturing industry; its variation and suitability determine the final market results and produce the goods that find favour or disfavour with the consuming public. The interests of the manufacturer are also involved in this preliminary choice, as his success or failure depends upon the raw silk he uses if other conditions are normal.

I shall, therefore, try to establish an organic relation between the several forms of the raw material on the one side and the finished goods on the other, by investigating the nature and quality of raw silk and other materials used in this country and also the effect of each quality on the ultimate product and intermediate processes. This will supply the Indian producer with the desired information.

Chapter III

RAW SILK

THE most important factors of production in manufacturing industries, when other conditions are normal, are the regulated supply and proper choice of the raw material. The significance of these factors is much more prominent when the raw material is silk, which is a very delicate fibre to manipulate. In so far as raw silk has to pass through a number of processes (from winding to weaving) before it is converted into a finished commodity for the market, and in so far as it has to undergo the tension of iron machinery, its quality means a good deal to the manufacturer and its power of undergoing considerable torsion is a consideration of vital importance. It is therefore essential, from a commercial as well as an economic point of view, to understand the principles governing the choice of raw silk as a suitable material for manufacture of textiles.

The subject may be considered in two aspects, firstly, the common defects in Indian and other raw silks which make them unsuitable for manufacturing purposes, and secondly, the utility and suitability of different grades of raw silk. But it may be noted, however, that these two aspects are closely related to each other and finally one runs into the other without obviously affecting the position of either.

Before dealing directly with the first aspect I shall enumerate the various kinds of raw silks used in the British silk industry. The whole supply may be divided into European " raws " and Asiatic " raws." The former group consists of Italian and French silks, the finest qualities of which are known as " classical " and " extra classical " in this country. All these silks are filature-reeled and possess the qualities of good " raws," except some which are known as " common." Comparatively speaking, very little European raw silk comes to this country owing to the fact that

the demand in the home market is more than sufficient to absorb most of the supply and keep up the price. Thrown silk is, however, imported into England from the Continent for very high class of goods on account of its relatively cheap cost and fine quality. In some cases "singles" are also used or thrown in this country.

Among the Asiatic countries, Japan and China are the biggest exporters of raw silk for the British market. Raw silk from the former country comes in different grades, commercially known as extra No. 1; Nos. 1, 1½; No. 1½; Nos. 1½, 2, and No. 2; [1] beside these, different filatures have their respective chop marks. The colour is generally white and in some cases greyish white as compared with the yellow of the European silks.

Raw silk from China is divided into three classes, each class being named after the method of reeling. Tsatlee is the commonest and oldest form in which the China raw is imported into this country, and is commonly known as "tsatlee reel." It is a very primitive kind of reel and shows a certain amount of inconstancy in size. The different grades run from No. 2½ to 5¾ without any definite classification either under these grades or under the main class. Shippers style them according to their own recognized standard. There are about thirty or more chop marks known in the trade and found in the lists published by the shippers.

The next class is known as re-reels and is much superior to the former owing to the re-reeling process and improvement made by a subsequent process of cleaning. Its name denotes the recurrence of a process in which bad pieces and other defects are more or less rectified. The skeins are sorted and sizes graded so as to introduce a greater uniformity than is found in the tsatlee. Like the former, the re-reels are also divided into grades, and are shipped under a chop mark which denotes the quality of that particular kind. But this system of classification is misleading and can be useful only to those who have been accustomed to it for a long time.

[1] Grades of raw silk, defined according to quality.

The finest quality of China silks is known as "steam filatures." These are reeled on most modern lines and in these there is much more uniformity of size than in either of the two classes mentioned above. The work of reeling is carried out under skilled supervision and in a centralized system in which great care is taken to secure the maximum uniformity in size and length of skein. This kind of silk finds favour in the British market, and, in spite of its expensiveness, it is largely used in good class work. This is also sold under chop marks which, in some cases represent the name of the filature, in others are arbitrary names.

These silks are all imported through Shanghai, and are universally known as "Chinas."

There is another class of raw silk which is imported from Canton and largely used in this country for cheaper goods. This is quite different from "Chinas" both in quality and price and the demand is limited to coarser work where very fine thread is not required. There is a vast difference in colour, texture and touch between the Chinas and Cantons. While the former are pure white the latter are comparatively dirty and do not possess the firmness of the Chinas whose thread is strong and compact. The Cantons are fluffy and cannot be used for goods where pure white bottom is desired. These are shipped in the same form of reel as the Chinas.

As explained in the historical sketch, Bengal raw silk was formerly largely used in this country, but now it has fallen into disfavour owing to an enormous increase in production and improvement in quality in Japanese and Chinese silks. There is no continuous importation now; only small quantities appear on the market every now and then. Moreover, the supply is comparatively very small for an export market. The distinguishing feature of Bengal raw silk is its bright yellow colour and its soft and spongy nature which makes it suitable only for a limited number of manufactures. These silks used to be shipped under different names such as the soleil, surdas, rose filature (known by the same name even at present) and Chandpores, etc., but it seems to me that, during recent years, even the favourite marks have disappeared from the market, and at present, although some

manufacturers are eager to purchase fairly large quantities, they cannot get them.

Before the war, near Eastern silks such as white Brucia, and Syrian silks were also used to a small extent in this country. They were considered to be of a very good quality by some manufacturers and found a good deal of favour in some high-class trades. But on account of cessation of all communication with those countries during the war, no more new supplies have been received in the market and their place has been largely taken by the yellow Italian silk.

In recent years, Kashmir raw silk has also been used by three or four silk manufacturers. Its superiority to Bengal silk and its good qualities have made it fairly popular, but on account of the comparatively short supplies and its large consumption on the Continent, the British manufacturers have not had the full opportunity of giving it a good trial. The colour is yellow, but not as yellow as that of Bengal silk. It is imported into this country through Bombay, and is sold under chop marks or grades, known as No. 1, No. 2, and No. 3.

Mysore raw has also been used from time to time in this country, but on account of a very limited amount exported, it has not been advertised in the manufacturing areas. There is no doubt that this kind of silk which is of a light greenish white shade would find a considerable market if production were increased to such an extent as to export large and continuous quantities of it to foreign countries.

After having obtained a knowledge of the kinds of raw silks used in the British silk market we are in a position to investigate the defects which are commonly found in those silks. With regard to European supplies, it is unnecessary to examine their qualities or defects, as in the first place, their limited importation prevents inferior grades coming into the market, and in the second place the improved methods of production which follow the application of science do away with those difficulties which arise in the course of manufacturing processes, and give results in the highest degree satisfactory.

We have now to turn our attention to Asiatic raw silks

and examine the chief defects which make them unsuitable for working purposes and deteriorate their commercial value. This analysis is meant to help production in India and to insure against a future decline and disfavour in the using market.

These defects of raw silk may be divided into three groups, those which influence the quality of the manufactured product, those which affect the cost of production and those which limit the scope of its utility.

Those defects which affect the quality of goods produced may be sub-divided into two heads, lack of evenness and cleanliness. The former is represented by fine and coarse threads and is a result of the neglect of the reeler who fails to nourish the thread with the necessary cocoons, and after discovering that the thread is running fine adds several fibres at once with the result that the superfluous ends increase the diameter of the thread to an appreciable extent, and during the process of cleaning are at once caught by the cleaner. An excessive number of fibres causes coarse threads, and double cocoons bring about a similar defect. Thus there is a lack of uniformity in the size of the resultant thread, in other words, there is a deviation from the mean denier on which the raw silk is sold.

This defect is very serious and badly impairs the quality of the goods produced. When a manufacturer puts on the market a distinct brand of cloth under a specific trade mark, he is expected to produce a uniform article throughout the season and to do this he must have a uniform stock of the raw material; otherwise it would be impossible to obtain uniformity in the finished commodity. In estimating the final weight of the cloth a manufacturer calculates on the denier, i.e. so many ends in the warp, and so many picks per inch in the weft should give a certain weight of cloth per yard. But when the variation in the initial fibre is too much, there is a considerable loss and inconvenience in the process, and sometimes the finished goods have to be sold as defective; which means that material of one grade has to be offered on the market as belonging to an inferior grade.

Next comes cleanliness, lack of which renders the quality

of the manufactured product unsatisfactory, and makes it unmarketable under the grade in which it is intended to be sold. This uncleanliness is represented by the following defects: bad knots, waste sticking to the thread, nibs, slugs, and split ends. It is difficult to give them any technical names, but as a matter of convenience, the above mentioned will serve the purpose.

As a rule, a commercially good skein of silk is considered to be of continuous length knotted together by short knots, about one-tenth of an inch or shorter.[1] When these raw knots become larger in size, they appear to be a defect and should be avoided in reeling as far as possible. A bad knot can be easily spotted by looking at the glued ends, and causes considerable trouble in throwing and manufacturing, and therefore must be counted as a defect. Sometimes these knots are made in re-reeling the skeins dry, and about 40 per cent. of them break out in throwing.

The loose formations on the thread spreading out in all directions may be regarded as waste. These formations of waste are very troublesome and about one third break out in throwing; those that remain behind appear on the cloth or other goods made from thrown silks containing them. Larger portions of waste are found in lower grades of "raws." Small flossy filaments sticking to the thread are commonly known as nibs, and those that are large or oblong are called slugs. These appear more numerous on silks of a harder nature, and are not removed in throwing. They show very badly in the dyed state and form a serious handicap in working, in addition to showing soft brushy filaments on the smooth surface of the manufactured goods.

All the above defects (if not removed during the process of cleaning) diminish the value of the finished commodity, specially in high-class goods where the excellence of the article depends upon the quality of its finish and where perfection in manufacture determines the price.

Now we have to consider those defects which increase the

[1] Compare *Silk Essays* published by the Silk Association of America, p. 30. Average knot is about one-tenth of an inch.

cost of production. These defects chiefly affect the preliminary and important processes of winding and throwing. The present tendency of the British manufacturer is to emphasize two things strongly: (*a*) the speed with which silks can be wound, and (*b*) the amount of waste made in throwing, because with every unit of time lost in preparing raw silk for weaving, the cost of producing that commodity is rising considerably. If on the other hand, the job is paid on the piece-rate system, the winder complains of the raw silk given to him for winding.

For purposes of classification, those defects which directly affect the cost of winding may be named as follows: large gum-tacks, presence of a large number of split ends, loops, corkscrew threads, many slugs, large knots, double ends, etc.; while those that indirectly affect the same and also cause poor winding are, lack of uniformity, irregular form of reel, and ineffective lacing.

These defects impair the efficiency of the winder in various ways; for instance, when the silk has been reeled in such a way as to form masses of gum where the skein rests on the reel arms it is difficult to soften these spots and keep them soft until the skein can be unwound. The gum marks therefore cause frequent breaks and often the silk is degummed by rubbing with the fingers which is necessary to free the thread so that it will unwind without trouble. Sometimes more soap and warm water are required for the simple process of softening the silk, and hence there is more trouble apart from the extra increase in the cost of winding. Thus poor winding affects the output of the throwster and decreases the wages of the worker.[1]

Slugs, knots, and waste cause trouble in another way, they catch the thread and when running fast break it, especially when the skeins are large and heavy like those of Cantons. Double ends, split ends and loops are often several yards long and cause a great amount of waste because they must all be removed and discarded.

[1] The winder is paid at a piece-rate, wages varying from 15*s*. to 25*s*. a week.

Ineffective lacing and insufficient and irregular crossing of the thread in the reeling of silk from the cocoons or in the re-reeling cause the thread to be tangled and break and also add to the waste produced in throwing. In other words bad form of the reel and other defects in its preliminary manipulation such as lacing, etc., cause unnecessary waste of time and labour. If, in addition to these defects, the thread happens to be sticky, then the result is an extremely poor winding.

Lack of uniformity in size is such a serious defect that besides affecting the quality of the manufactured product, it raises the cost of production as well. It affects first of all winding and then throwing. A raw silk thread which contains many fine and coarse parts will break in the fine places. The swifts upon which the skeins are held automatically stop and the ends have to be tied together again to continue the process. The larger the number of breaks the more is the time lost in winding, and hence a poor output and less wages for the winder.

When the skein passes to the next stage of manipulation, that is, from winding to throwing, it has to be transferred to suitable bobbins for the throwing machinery. An intermediate process is that of cleaning, in which the thread passes through two cleaning knives. As the thread passes through these steel knives, the presence of any knot, nib, or coarse thread is immediately detected and by means of a simple automatic arrangement the receiving bobbin is stopped. These faulty pieces have then to be taken out and thrown as waste. Here again we have an extra loss of time as well as waste of good silk which otherwise would have formed part of the real material. In other words, there is an increase in the cost of production which is felt still more in the process of throwing the silk.

It must be remembered that throwing involves the use of high-speed spindles, the speed of the vertical bobbins varying from 5,000 to 10,000 revolutions per minute according to the twist desired in the thrown thread. Moreover, the thread has to stand a considerable tension while passing from the vertical to the horizontal spindles. If the silk of a given

denier is set at a certain speed, and if, owing to the fine pieces in the thread, it breaks very often it naturally impairs production and increases the cost. Calculations are generally made on the denier basis, and the process is regulated accordingly. Uniformity of size is therefore an essential factor and its absence affects nearly all economic phases of the industry.

Other defects which indirectly affect the cost of production and are not very serious are, moisture, the amount of gum (that is, loss in " boil off ") and " condition," by which is meant the tenacity and elasticity of raw silk. As a matter of fact, the amount of moisture contained in the silk is determined by the conditioning house before the supply is sent to the manufacturer, and hence matters little to him. But still a manufacturer once jokingly said to me, " We don't like to pay for water," which was meant to denote that there was no serious complaint against it, and that things were quite satisfactory as far as moisture was concerned.

Loss in " boil off," which is determined by the amount of natural gum contained in the raw silk, does matter a good deal, as in certain cases where this loss is heavy it does affect the yield and touches the purse of the manufacturer, but it is not a very serious consideration on account of the fact that in the long run this loss is bound to exist in all raw silks. Comparatively speaking only an extreme makes any appreciable difference. From 18 per cent. to about 23 per cent. is commonly found in all classes of good raws, but if it rises beyond that up to 30 per cent. it becomes a depreciating factor.

Tenacity and elasticity are factors which enter into our present discussion in two ways, first of all by affecting the cost of production, and secondly by influencing the quality of the goods. For instance, if a raw silk thread is brittle and tough, instead of elastic, it behaves differently in the loom and produces unsatisfactory results. It " fluffs up " in the havel and spoils the cloth, which finally means a loss to the manufacturer. The working expenses for that particular commodity are increased, and sometimes trouble is caused in the finish. But mainly, the effect of these two factors

is extended to the third part of our subject, that is, the consideration of the utility of raw silk.

Before passing to the third part, I shall summarise the above considerations in order to show how raw silk is organically connected with its manufactures, and how the choice and selection of the raw material is the most important part of the business of the silk manufacturer under existing industrial conditions in England.

First of all, we have the complicated problem of wages which is becoming more and more difficult every year. The British manufacturer has to work under changing circumstances and has to meet the competition of other industries in the British labour market ; and therefore owing to high labour charges, he is no longer in a position to pay high prices for his raw material. As I have already pointed out, this difficulty has been keenly felt owing to war conditions, and at present, it is difficult to anticipate how this difficulty will be removed after the war. Secondly, the current charges may rise considerably and make the total cost of production go above the normal level. Thirdly, the manufacturers have to rush orders sometimes, and to do this they must have silks that run smoothly through all the operations. If, in the face of these problems, raw silks with the defects explained previously come into the market, then naturally the manufacturer is justified in choosing what he considers best and in refusing what does not appeal to him.

Looking at the labour and output from a practical point of view, we are led to consider that poor winding reduces the amount of thrown silk which can be produced in a mill, and if the plant is kept idle for a number of days without any return, the situation becomes dangerous for the millowner. Moreover, defective raw silk and consequent poor winding lowers wages ; and the winder has thus no incentive to work hard. This lack of interest on the part of the worker reacts on the stability of labour supply ; for the winders might be induced to transfer their services to another manufacturer employing good winding silks. This transference of labour limits the scope of a manufacturer who produces ordinary

goods and increases activity in another firm where only high-class goods are produced.

The difficulty is therefore continuous, and the defects, while increasing the cost of production, decrease the value of the finished commodity, as frequency of fine ends and ueven thread tend to produce an uneven product when they are not removed in the first few stages. But the greatest waste, from an economic point of view, is that even if cocoons are of a good quality and are expected to give good raw silk, defective reeling deteriorates the quality of the thread ; that is to say, we have a bad economy because good cocoons render only faulty silk.

Let us now take the third part into consideration, that is, the defects which limit the scope of utility of raw silk. These are explained by two properties of silk, its colour and nature. We are perhaps not justified in calling them defects as primarily they do not come under that category. At the same time, there can be no universal utility for any raw material whatever. With regard to raw silk, the utility of various qualities and colours is limited to particular trades, and in so far as each colour satisfies the demand of its own province, its utility is positive.

The same conception applies to the nature of a particular kind of raw silk. It may be suited to one trade and produce the desired effects and may be discarded by another trade, so that different kinds may have different uses.

Silk may be divided as regards its colour into yellow and white. Each of these has particular advantages and serves special purposes ; for instance, where a black bottom in a cloth is desired, yellow works excellently well and takes all darker shades ; on the other hand, where pure white bottom is required or where light shades are preferable, white raw serves best. It is very difficult to bleach the yellow completely and to bring it to a natural white, in spite of the fact that modern methods of bleaching are more or less perfect and give satisfactory results. Of course the question of cost comes in when the extra charges for bleaching the raw silk are included as a separate item, and that is why the manufacturers prefer to use white silk for white goods or

lighter shades, and do not mind using yellow for black and darker articles.

With regard to the nature of silk, it is difficult to give a scientific classification, as the selection depends largely on the experience of the experts who determine the " feel " or " touch " of the raw silk after other properties have been determined in the conditioning house. Owing to a long experience in handling silk, the experts can readily find if they are dealing with a particular nature of raw. In certain cases the raw silk is soft and spongy and lacks what the manufacturers in this country describe as " bone " in silk. Sometimes they say there is no " life " in the silk, and for purposes of comparison, silk of a soft nature is described as " dead " silk. These expressions denote something more than mere elasticity or tenacity and peculiarly define the uses of the various kinds of raw silks.

The presence of " bone " in silk is regarded as essential for manufacturing purposes, as the absence of it would cause trouble in the loom; a raw silk that lacks this property cannot very well stand the tension in the havel. But when it is merely a matter of preparing raw silk for slight twists and sewing silks, soft silk works very well. So that each silk whether " bony " or " dead " and soft has its own use and either property limits the scope of its utility. In the next chapter I shall discuss this part of the subject more fully and examine the requirements of the British silk manufacturer in detail.

Chapter IV

USES OF RAW SILK IN DIFFERENT TRADES

Grades and Sizes

In order to make the subject instructive for the producer of raw silk, it is necessary to study the various kinds of raw silks that the British manufacturer uses for his varied purposes. The quality of the raw material in each case is determined by the use which is to be made of it. It is, therefore, possible to find out manufactures in which Indian raw silks could be used with advantage.

The manufacture of broad silks, such as, crêpe-de-chine, crepoline, georgette, and other plain silks, is a very important part of the industry and consumes large quantities of raw silk. This class of manufacture needs a very fine quality of silk which does not give brushy filaments on the surface of the goods, and from all my inquiries I conclude that the presence of "bone" in the silk is an essential quality required for these purposes. Strong elastic silk is much preferable to soft "dead" silk. Even sizes are necessary, as even and regular effects are desired in the finished commodity. Another reason in favour of strength is, that an excessive amount of twist is put on the thread in order to get the crêpe effect. If the thread is soft and becomes sticky after dyeing it is absolutely unsuitable for broad silks. In short, fineness and regularity are two characteristics that cannot be ignored in this trade. Filaments, due, as a rule, to the softness of the silk, are very bad for the manufacture of dress goods. Two threads lifting together in the reed spoil the cloth and splitting filaments give the surface of the cloth an irregular effect.

In this trade, generally, white silk is preferred to yellow, owing to the large range of lighter shades needed. Another reason of some manufacturers' objection to using yellow silk is that in their opinion it loses more in degumming than white

silk does. In case of bleaching it has to be passed through a stringent bath at a temperature of 150° F. The loss sometimes amounts to about 27 per cent. and in addition to this, the thread loses a part of its strength as well.

The favourite brands used for "class" goods are China filatures, re-reels, Japans 1½ extra, and sometimes Italian silk. They possess an even and smooth thread and have a considerable amount of life in them. For comparatively cheaper materials, Cantons and tsatlees are also used to some extent. The most useful and extensive sizes for this trade are 13/15 and 18/20 deniers, but in some finer goods 10/12 deniers are also used.

Formerly Bengal raw silk was used for the manufacture of silk taffetas and broad silks. It was fairly popular in the British market and in the time of the East India Company,[1] large quantities were thrown into tram and organzine for the purposes of the silk trade. But extended supplies of superior silk from China and Japan replaced this class of silk and gradually owing to its low quality it disappeared from the market. In recent years, some manufacturers in England and Scotland have tried small quantities, but unfortunately they had to abandon it owing to bad results. The following report by a manufacturer of broad silks shows how the Bengal raw proved a failure:—

"BENGAL SILK.—Our opinion is that it is most unsatisfactory, and, by comparison at all events, increasingly so.

"Many years ago we used Canton tsatlee, but we got on to Bengals, and were able to get our weaving done at a lower rate. This continued for some years, when we began to find it more difficult to get satisfactory parcels, and we were forced to fall back on Canton again, this time the filature silk, introduced in the meantime, and a great improvement on the old tsatlee. We made extended trials, and as a result, the weavers were glad to take the white at the same price as the yellow, and ever since they did so, they are by no means pleased when they have yellow silk to deal with. We are quite sure that the quality has been steadily deteriorating, and three or four years ago we decided to buy no more unless absolutely forced. We were, however, last year persuaded to try a few bales of a new brand, which was to be vastly superior (and the samplers we saw cer-

[1] See Historical Sketch.

tainly appeared so), but it did not at all work well, and we were very thankful to get to the end of them, which we did sooner than we should have done.

"You will naturally ask in what way the Bengals are inferior. They are uneven in sizes, although perhaps not more so than the ordinary Canton, but they have also very many thick threads running either a few inches or a few feet (due, I believe, to drawing off too much of the cocoons), which makes a bad place in the cloth, and which are not sufficiently thick to be removed by any ordinary process of cleaning as a genuine slub might be. The silk also seems to have much less 'life' in it than Canton.

"We use a great deal of highly twiste s ilk, and we find that to get a similar contractile effect, we have to put a greater number of turns per inch into Bengal than we do into Canton of the same size. Neither does it work so well in the havel."

The above report clearly shows the unsuitability of Bengal raw silk for high class silk manufactures, in which perfect smoothness of surface is desired. In almost every instance, during my investigations, I found that the manufacturers of this class of goods complained against the quality of Bengal raws, and expressed dissatisfaction with the more recent imports, indicating, however, that twenty years ago these silks were fairly satisfactory and popular in the English market.

It is interesting to note here, that Kashmir raws, though not extensively used in this country, have been given a good trial by three big manufacturers. They are far superior to Bengals and have found favour with some consumers. A manufacturer remarks :—

"The Kashmir silks when first introduced were not so well reeled as the filature silks of Italy, Japan, China and Canton. The winding test only showed 40/50 tavelles as against the productions just named 100 tavelles, and the Kashmirs were not so clean and evenly reeled.

"But these silks have been greatly improved both in reeling and cleanliness since then and now compete with Syrian silk and second order Italian filatures. They have been used in the manufacture of broad silks, crêpe-de-chine, etc., specially in the weft. They take black dyes well and are fairly lustrous."

The manager of a large manufacturing firm, at present the biggest consumer of Kashmir silk in this country, gave me his opinion as follows :—

"It chafes badly in the havel and produces a considerable amount of waste in winding which is due to the fact that it contains very bad gum-tack marks, and with much breaking ultimately lowers production. When it passes to the loom it has been observed that the time taken to weave two yards of China filature is equivalent to one of Kashmir, so that other conditions being equal, the output is exactly half. In other respects, Kashmir raw is fairly even and clean. Recently they have been packing very bad silk in the centre of the bale. This should be remedied at once."

In mixed goods, Kashmir silk can be used in the weft and cotton or wool in the warp. In most cases this mixture has proved a success, especially when it was used with other good qualities of silks; the only defect being that it is very difficult to bleach Kashmir raws. The slightly yellow colour cannot be got rid of even after a good deal of degumming and bleaching.

A Scotch throwster's opinion is that owing to excessive gum marks in Kashmirs, and also to too much loss in "boiling off" (up to 27 and 28 per cent.), another 10 per cent. is put on its price.

A large number of other manufacturers have expressed satisfaction after a careful inspection of the samples shown. It is maintained that Kashmirs could be used in the manufacture of bridal veils and ladies' face veils. At present, Brucian, Syrian and classical silks of Italy are used in this trade, but if Kashmir raw thread possessed good tensile strength the manufacturers would be quite willing to try 13/15, 14/16, and 18/20 sizes. Every fibre is visible to the naked eye in goods like veils, and it is therefore necessary that the initial thread should be strong and regular. If these conditions be fulfilled then the lustre and brightness of Kashmir silk would undoubtedly help it to find a ready market. In black dyes, it could be made available for the hosiery trade which would absorb considerable quantities.

Another most useful thing would be to extend the use of Mysore silk in this country. After exhaustive inquiries I came to the conclusion that most of the manufacturers had a very good opinion of Mysore raws. For purposes, such as plain cloth, lining silks and shirtings this class of silk could

be used with advantage provided prices were favourable (that is could compete with Canton). Its light greenish white colour is in its favour and the thread is fairly even and clean. In 13/15 deniers, it would have a pretty large consumption if supplies were regular and quality constant.

Next we shall take the manufacture of tie silks, fine knitted mufflers and ladies' knitted goods. These manufactures are chiefly concentrated in Macclesfield and Leek, and deserve our particular attention on account of a large consumption of thrown silks. It may be observed that only special goods are produced in this country of this particular class and therefore only good raw silk is used for these purposes.

Generally speaking, white silk is preferred to yellow in this trade, though large quantities of the latter are also used for darker shades of goods. Tensile strength is an essential quality, as in the Jacquard loom, when goods of special patterns are to be made, there is a great tension in the fibre due to the continually fast moving parts of the machinery. In woven tiesilks, Japan and Italian raws of 13/15 size are largely used; only in Scotland are 9/11 and 10/12 sizes touched, but there is a limited demand for these finer sizes. In some cases, in knitted goods, manufacturers also use 14/16 and 14/18 deniers and even coarser sizes such as 20/24, 24/28 and 26/30; the latter sizes are used only in the manufacture of silk laces and coarser goods. Re-reel Chinas and tsatlee reels are quite favoured by some. If coarser sizes of a good quality of Kashmirs were available, there would be a great possibility of introducing them in the place of Chinas. Most probably, Mysore raws of the above sizes will also find a market in this trade. 14/16 and 16/18 deniers raws, and two or three threads in the tram are also largely used for the Nottingham and Derby hosiery trades, where, at present, Italian classical is used.

The manufacture of mourning crêpes is another important branch of the industry which has gained prominence during the war, on account of the cessation of the Continental supplies. In some cases, the manufacturers here received orders from the French dealers and had to rush their goods to supply the increasing demand. It is obvious that the

consumption of raw silk is of considerable importance in this trade and is increasing for the time being at least.

The industry is established in Norwich and Yarmouth where it has existed for a long time. A favourite silk for crêpes is No. 1 Canton filature. The chief sizes run from 13/15 to 24/28 deniers, but generally, 16/18, 16/20, and 18/20, 18 /22 are used, only occasionally 22/24 is attempted. One manufacturer still uses Bengal rose filature silks of 16/20 or 18/20 deniers.

In the manufacture of crêpes, also, thrown silk must have a good deal of " nerve " in it. In addition to the process of weaving in which the strength is sufficiently tested, the woven cloth has to pass through a number of " steel presses " at a very high temperature in order to convert it into crêpe. This process requires good deal of " life " in the raw material as the punishment of various kinds during the manufacture tires out the life of raw silk. Here again, Bengal silk of a good quality could be used if reeling were improved and silk were produced clean. It is not necessary to use a very high class of raw silk for this class of goods. A manufacturer told me that he would be quite willing to go back to Bengals if his requirements were properly attended to.

Now we come to the sewing silks industry of Leek and silk cord and trimming industry of Derby. The former branch of the British silk industry still consumes large quantities of real silk in spite of the competition of artificial silk. The latter branch, though very small in extent, is interesting so far as its requirements are concerned.

Coupled with the sewing silks is the manufacture of embroidery silks, ladies' knitting silks and laces. There is a great range in this class of goods and hence the qualities of raw silks used vary with the nature of goods to be produced. Sizes run from 12/15 deniers to 26/30 deniers, and in the case of a London firm, they prefer 8/10 to all others, but, of course, the latter is only rarely used and is meant for very fine sewing silks. For the Leek industry 26/30 and 28/30 are the best sizes. Re-reel Chinas 20 /24 deniers and filature Japans 13/15 are used for " machine twists," while Canton filatures 26 /30 are used for " hand twists." Cantons are

also used for knitting silks, as they answer equally well as did the best quality Japans which were dear and could not produce the article cheaply for the general market. Some manufacturers in Leek used large quantities of 16/20 and 12/15 deniers Bengal. One London firm used 16/20 Salvation Army silk and found it quite satisfactory for embroidery purposes.

The fact that manufacturers, at present, use large quantities of Cantons, shows that the export of Bengal raws has very much declined. Formerly Bengal silk was very popular in this branch of the industry and even now some manufacturers would be willing to go back to Bengals if sufficient quantities were available. The following extract from a letter shows that there is still a large demand for Bengal raws, though confined to sewing and embroidery silks :—

"In the case of Bengal silks, as we also pointed out to you, in the past when these silks were obtainable we used this class of silks to some considerable extent for certain purposes. Of late years, however, this silk has been unobtainable, more especially in the stouter sizes, such as 26/30 deniers as we have been given to understand the native filatures have given up reeling in this particular size and only reel in finer sizes. If the native filatures could be persuaded to reel the silk in the stouter sizes we should prefer to go back to this class of silk rather than to use China and Canton silks, which we have had to substitute, owing to the fact that Bengal silk, on account of its cleanness and working properties is more adaptable. At the same time the question of price as compared with Canton and China silks will always largely enter into the question."

It is therefore quite obvious that Bengal raws if reeled in proper sizes would do excellently well for purposes of making sewing and embroidery silks. There is no doubt that competition with Cantons is becoming more and more keenly felt, owing to a fall in the price and improvement in their quality ; but there is no reason for discouragement, as with slight improvement in quality and with better trade organization Bengal silk could win back its former reputation.

Rose filatures and the surdas were the favourite brands for a long time. The following extract from a dealer's letter explains the position :—

"Some years ago, a portion of these Bengal silks was re-reeled and sold in London under the names of primo and secondo. In Lyons, the firm of L. Payen & Co. sold these re-reels under the title of 'soleil' and they obtained a higher price (4 or 5 francs per kilo) than those of the ordinary reelings, sold under the names of rose filature, rangamatty, ramnugger, etc. These re-reels were more appreciated by the manufacturer and eliminated some of the fine places and bouchons. Recently some silks appeared in the London market under the name of 'soondors.' These were found very satisfactory and much superior to rose filature. It seems that the supply of all these silks has either disappeared or is broken, and that is why the manufacturers have ceased to depend upon them."

Bengal silks are particularly suited to the Leek industry for two reasons; firstly in the manufacture of sewing silks, twists, and fringes, their pliability in the operation of twisting gives these silks a wider range; secondly when dyed they give good lustre in black and pure 12 ounce dyes. They are not suited for the heavy metallic colour dyes, as they will not stand the punishment in the same degree as the silks of Italy, China or Japan. Another point in their favour is that, in this trade, colour does not matter much and according to a statement by an expert, about 96 per cent. of the trade could be done with yellow silk, as the bulk of sewing silks have to be dyed black and yellow takes good black and darker shades.

In almost every case, the manufacturers give first place to the November bund in Bengal raws. March bund comes next in order of merit and July bund is considered to be inferior.

The manufacture of silk cords and trimmings next attracts our attention owing to a still greater probability of introducing Bengal raws into this branch of the industry. Though consumption is comparatively very small, yet there is a probable outlet for that class of Bengal silk which is unsuitable for other purposes. The essential qualities required for silk used in this class of goods are softness, smoothness, lustre, large spreading capacity, and flossiness.

As a rule, the raw silk used for cords is a "no throw" silk, that is, having about one turn to twelve inches. It forms the

outer covering for the cotton cord inside, and it is, therefore, essential that it should lie well in what is known as " bed," leaving no space between the threads, in order to give a " closing up " effect and make the cord look more lustrous. The Derby and Nottingham markets take a fair quantity of this class of silk for fancy braids and covering of cords for the furnishing trades.

At present, tsatlees of 24/28 deniers are used for this trade. It is very difficult to estimate the quantities used or even to anticipate its future extent, as so much depends upon the fickle favour of fashion in the ladies' millinery trade and also on the use of artificial silk. But whatever the case may be, there is always a certain demand for the coarser sizes of silks, and tsatlees could be replaced by Bengals with advantage to both sides.

After having reviewed the whole situation, we are in a better position to define the exact requirements of the British silk market. Under the present conditions of higher cost of throwing and manufacturing, it is quite plain that only those silks will be in demand in future that will give the best results in winding, etc., and ensure a maximum of production for a minimum of cost in working. In England, as also in America, high speed machinery is used to obtain production on a large scale, and if the defects which have been discussed above exist in large numbers, then there is no possibility of increasing the area of distribution for any class of silks. It is imperative that all those defects should be carefully removed and raw silks properly graded before they enter into the market. There is no doubt that use can always be found for any kind of raw silk, but the problem of the extent of utility remains unsolved in that case. If the entire supplies are of a low grade then it is impossible to extend the market, and after the realization of certain limited demand, the rest of the stocks have to be thrown away as useless. From the producer's standpoint it is necessary to increase the production of good class of raw material and limit the production of inferior grades to a minimum in order to compete with other supplies in the market. Profits will naturally increase when better prices are obtained and this

will give a healthy impetus to the silk-growing industry of India. To put the matter shortly raw silk should be even in size, perfectly clean and equally strong throughout. If this is achieved then there is an unlimited demand for it in the market.

We shall now pass on to the utility of SILK WASTE, and find a link between raw silk and its by-product.

Chapter V

THE SILK SPINNING INDUSTRY

Waste Silk

The problem of waste silk is at least as important as that of raw silk. The increasing utility of all kinds of waste in the English spinning market, and the popularity of cloth made from spun yarns in this country as well as abroad, make the subject more interesting than before. The fact that English spun yarns have no rival in the world either in fineness of quality or in perfection of texture and finish, remains as firm as ever. Now that the spinning machinery is being improved every year, and the working efficiency is rising high, there is a great demand for good yarns in the home and foreign markets. We have therefore to pay particular attention to this part of the British silk industry. Of late years, England has been supplying the American market with spun yarns which have surpassed the Continental productions. This reputation, and the resulting encouragement due to pluck and industry have given a fresh impetus to spinning, and in order to compete with other markets, this impetus must be kept up at all events. There is no doubt that machinery and skilled labour have helped a great deal to win this renown, but the fundamental factor, that is, the importance of the raw material, has always had a considerable effect on the final product, and if the supply of the raw material is constantly maintained, then the reputation of the English spun goods will be recognized all over the world and the industry will become thoroughly established.

We have seen in the chapter on "Raw Material" that silk waste is obtained from two main sources—waste obtained during the processes of producing raw silk, and the waste produced by the winder, the throwster, and the manufacturer. So far as India is concerned, the former kind is of great interest to us, the latter is the result of manufacturing and is not made in such considerable quantities in India as to be of any practical interest.

The main supply of waste is imported, at present, from China, Japan, and Italy, and is known by different names. The principal kinds used are, best Piedmont gumwaste, Italian knubs, China curlies, semi-extra China curlies, steam waste, and yellow chassum Kashmir waste. Other kinds are also imported and are known in the market by their commercial names. For purposes of a clear distinction, the best division will be, (*a*) gum wastes, and (*b*) knubs. The former is the result of reeling and other producing processes (including winding and throwing wastes), and the latter is what is known as the cocoon waste. Generally, the latter is preferred to the former and is supposed to give better results in the long run. But both are equally in use in England.

Bengal waste was formerly used in large quantities, but at present its consumption is very small, due partly to lack of supplies and partly to its unsuitability for the English market, which I shall discuss at length later. Other Indian wastes have also been used from time to time, with somewhat satisfactory results, but on the whole there has not been a very large export for the last few years. Of course this decline is an obvious outcome of a decline in the production of raw silk, of which the waste is a by-product. Recently, however, the Kashmir waste has found favour with the spinners and fairly large quantities have been used, both in the form of gum waste and knubs. It has satisfactorily competed with Japan waste, and if slightly more care is taken in grading, etc., it will find a ready and an increasing market here.

As in the case of raw, we have first to determine the quality of waste suitable for spinning purposes. It is interesting to find that a similar principle applies here. For a careful consideration of the waste silk problem, we shall have to find the defects that are generally found in supplies imported from India. These defects can be divided into two heads, first those that affect the quality of the finished spun yarn, and secondly those which influence the cost of production. But unlike raw silk, these two aspects are associated with each other in such a way that it is difficult

to separate them, because those defects which increase the cost of production are bound to affect the quality of the finished yarn and vice versa. We shall therefore consider them conjointly.

Before entering into an examination of those defects, I think it would not be out of place to give an outline of the processes through which the initial waste silk fibre has to pass. This outline would help us to understand the quality of the staple required for spinning and thus we shall be in a better position to sympathize with the difficulties of the spinner and to study his exact requirements. Moreover, it will show how each process determines the necessity of choosing good waste to start with in order to obtain good results at the end when the yarn is ready for the market.

The preliminary process of opening the bales and sorting them according to their colour and grade, or of mixing them up to suit further requirements, does not require any explanation, except in those cases where the bales are press-packed and need careful treatment while breaking up the layers of silk. It is only in the last case where trouble arises, and sometimes power hammers are resorted to. But generally this is done quite easily.

The first important process is what in England is known as " boiling off " or " discharging " and on the Continent is known by the name of " schapping." This is carried out in order to free the natural gum or sericin from the silk and to prepare it for cleaning and drafting. This process involves a good deal of labour and care, as the intrinsic value of the fibre for after processes in spinning depends upon the excellence of this process which if poorly carried out spoils the whole series of operations. Great care is taken to use good soft water and a fine quality of soap. The silk is subjected to boiling liquors of water and soap so as to get rid of the gum as quickly as possible. It may be noted that in the English " boiling off " process *all* the gum is boiled off the silk fibre. This makes it different from the Continental method of " schapping," in which about 10 per cent. of the gum still remains in the waste after a long drawn out process of fermentation. In the former process, degumming has

to be done comparatively rapidly and therefore there is much more tension on the fibre. There are two stages in the process, the first is thoroughly softening the gum and making the silk feel soft and " slimy " ; the second is washing off the gum and at the same time bleaching the fibre. The process is very delicate and great care is taken to keep the original properties of silk intact. Disintegration of the fibre is rigorously avoided. Extremes of any kind would either affect the strength of the fibre or make it absolutely useless. In case of under boiling, the waste requires a subsequent treatment which is always detrimental to the quality of the thread.

After the completion of the first process which includes bleaching and drying, the boiled off silk is carefully examined to remove all foreign matter that may be contained in it. Some kinds of waste contain considerable quantities of straw, China grass, hemp, hairs (of animals and human beings), hard twisted silk ends, bits of papers, etc. This process is called " picking," and strictly speaking is a waste of labour and capital. I shall deal with this point later in this chapter.

A process which is sometimes used in the spinning industry to destroy vegetable matter and other extraneous mixtures of a similar nature is known as " carbonization." Dilute sulphuric acid is used to carry out this process, and great care is taken to preserve the delicate nature of the fibre which if damaged by an acid is extremely difficult to remedy by any other treatment. In order to avoid the use of acids, the waste silk should be as pure and free from vegetable matter as possible. If subjected to these processes the original fibre has to undergo considerable punishment, and it is therefore necessary that the number of these operations be cut short by having pure supplies of the raw material.

The next step is known as " conditioning." The " boiled off " silk is allowed to absorb its natural moisture of 11 per cent. If the silk is dry and harsh it will not work properly, and if, on the other hand, it is moistened with water it becomes wet in patches and is rendered unworkable for after processes. To avoid irregularity in condition, the silk should be well and evenly dried. At the same time, it is detrimental to the

quality of the fibre to force it into condition ; it must have time to pick up moisture naturally. The best method of allowing it to do so is to construct a conditioning floor, and let it lie on it for a sufficient time to pick up moisture (generally for six weeks, but experience is the only guide in determining the proper time for the duration of this process). This is the natural method of conditioning and is carried out to let the silk recover its softness, natural strength, and elasticity.

When the silk is ready for " dressing " it is opened up so as to give it a most loose appearance and to take out the lumps of tangled fibre which need to be brought into a more parallel position. To do this, the silk is passed through various combing machines two or three times according to the requirements. When it is properly combed it is completely ready for dressing and preparing the staple obtained for purposes of spinning into yarn. The intermediate processes produce drafts which are technically known as " sliver " and " rover." The object of these processes is to still further straighten the fibres of silk, and to properly draw it out, because if the fibre is short, the silk is inclined to be loose and fluffy. Before the drafts are ready for the spinning machinery they must be perfectly long and compact, so that they can stand the tension in twisting (which is one turn of twist for each revolution to start with). First of all, the yarn is spun into singles and then doubled or put into three-folds as required. There are other subsequent processes of cleaning and " gassing " to give the spun yarn a finishing touch before it is sent to the manufacturer. These processes are all of a very technical nature and do not concern us here.

Let us now continue our previous inquiry and consider the chief defects commonly found in Indian wastes that have been imported into this country. The principal among these importations have been the Bengal wastes.

The experience of almost all the spinners has been rather discouraging with regard to these wastes, and most of them have found that, in spite of the cheap prices of these wastes, they are useless from a commercial point of view. The

presence of foreign matter such as vegetable fibres, cotton twisted into knots, hairs, bits of paper, and especially clay, makes the waste lose its real value. In some grades of waste, balls of silk, hemp fibres and sometimes mineral substances are found in abundance (from 10 to 15 per cent. or more of this objectionable matter) and therefore they are shunned by spinners.

Notwithstanding repeated boiling in *soap liquor*, the clay contained therein is not eliminated, and when the waste is dried, the clay appears in small particles of dust which is objectionable to the workpeople and causes the draft to be so sticky as to prevent proper drafting. The most objectionable feature from the English spinner's point of view is not that the waste contains so much of the manufacturing extraneous matter, but that it contains so much that is absolutely foreign to silk in any process, either of growth, manufacture or packing (for instance, loading with mineral matter to add weight as is sometimes found in Japanese bales as well).

The unfortunate situation created by these defects is, that though the original fibre may be of a fine quality, the presence of this foreign matter so lowers the grade that the spinners lose confidence in its quality and cannot utilize the waste to the best of their advantage. The following extract from a letter from a well-known spinner illustrates this point :—

"Respecting Indian wastes. *Fineness of fibre.* Our experience of the fibre of any waste we have seen emanating from India (excepting Indian tussah) is, that such fibre is very fine indeed and consequently yarns can be spun as fine in count from such waste as from any other.

"*Lustre.* The lustre of the silk is also usually very good. In our opinion the chief fault of Indian wastes lie in its bad sorting for quality, meaning by quality, colour, and coarse and fine wastes. Also in the abnormal admixture of foreign matter such as hemp, cotton, animal hair of various descriptions, including in some cases human hair. These are all faults which cause Indian wastes to be held in very low esteem, because to eradicate the extraneous matter entails excessive labour costs in picking or the use of carbonization processes. We think that all these faults can be remedied if the peasants are taught that they can obtain more money if they keep the waste free

from extraneous matter and also if they keep yellow and white separate and coarse and fine fibres separate."

It may be concluded from the above report by an experienced spinner that there are certain points in favour of Bengal wastes, for instance the fineness of the original fibre. It is well known that the tensile strength of the spun silk largely depends upon the fineness of the initial fibre, that is, the coarser the fibre, the less the strength. This is accompanied by another factor—the longer the staple, the better the yarn and hence more value, so that these advantages must be taken into consideration while selecting the grade of waste to be used.

The other defect which is commonly known as such, is the excessive loss in " boiling off." But it has been found from experimental tests that the silk that loses more in the " discharge " gives better lustre than the silk that loses less, or in other words, the final lustre of the fibre is proportional to the loss in boiling off, for instance best Japan which loses least gives least lustre. Therefore this defect cannot be regarded as very serious, as loss on one side is compensated by lustre on the other. There is no doubt that this is a vital point to be considered when the loss in boiling off is simply alarming, specially at present, when the price of waste has risen to 5s. and 6s. a lb. Another point that one may consider is that the value of the raw material is proportional to the yield after boiling, and if an extra 5 per cent. loss in boiling off increases the cost of the low grade waste, then the cost of the yarn made from it is also increased, and the margin left to the spinner is thereby reduced. But this argument can only be used when the loss is tremendous, otherwise, a slight difference this side or that side does not affect the cost of spinning very much.

A careful examination of the experiments carried out on " boiling off " of waste silk of various grades shows the relative difference in loss.

Quality.	Weight before Boil.	Weight after Boil.
China.	100 lb.	71 to 75
Canton Gum	,,	70 to 72
Steam Waste Knubs . . .	,,	60 to 63
China Curlies	,,	68 to 73
Shanghai (coarse)	,,	70 to 72
Indian Waste	,,	66 to 71
Punjam Books	,,	53 to 55

In so far as these figures are reliable, it is evident that in the long run there is not much difference between China curlies and Indian waste, and if it is compensated by the extra lustre this loss is not worth the consideration. It may, however, be possible from a sericultural point of view to reduce this loss to a certain extent and that may benefit the seller as well as the user of the waste.

What is most important is the complete elimination of the above-mentioned defects which in the first place impair the quality of the yarn and in the second place unnecessarily increase the cost of spinning. The yarn resulting is only a second-rate article and can only be used for very poor goods in which imperfections are either not seen or do not matter. The hairs in the waste, if not extracted during the process, appear in the goods produced from the yarn made out of that waste. In some cases, black spots have been found on the surface of the cloth manufactured from such yarns, and in these cases, apparently the goods become useless for a good market. If the yarn is full of these defects, it has to be used in conjunction with wool or some other textile fibres to hide them and naturally it does not pay the spinner to produce yarns of this kind.

With regard to the complete elimination of extraneous matter, it may be observed that some of it is extremely difficult to remove even after continued processes. But this does not apply to each and every kind of foreign matter ; for instance the presence of cotton threads can be easily

detected by using a blue dye which readily affects them without reacting on the silk fibres. All the cotton threads are coloured blue by this dye, and the silk remains uncoloured, the result being that cotton can be picked out. Of course, the question of cost comes in again. There is no automatic mechanical process by which this could be done, and the only alternative is to resort to the process of " picking " which involves considerable waste of female labour. After the waste is degummed and dried it is handed over to women to extricate *all* that is not silk. If the waste is bought at 3*s.* a lb. and 5*d.* a lb. paid for discharging the gum, the extra amount of labour required for cleaning it enhances the price by another 2*d.* a lb. or so. Again, small bits of paper, hair, etc., require minute examination and this makes " picking " a laborious job, a nuisance to the worker and an extra burden to the spinner. Even after the employment of this labour, small impurities of a peculiar nature still remain behind, and greatly deteriorate the quality of the yarn, which if free from these would undoubtedly command better prices.

As regards vegetable impurities, it has been pointed out before that the process of " carbonization " has been found very effective in most cases. It is largely used in worsted spinning for purging of vegetable matters from wool, but silk being very delicate stands the chance of being damaged by the application of acids. The difficulty arises from the fact that in England the waste is wholly discharged, and therefore, on account of the absence of gum, there is no preservative for the fibre against the action of acids. Another point is that the acid used in this process (sulphuric acid) finally reduces the vegetable matter to powder, the presence of which makes it difficult for the spinner to clean the silk thoroughly. This method is, however, used on the Continent where the gum is not wholly discharged from the silk and the fibre remains unattacked by the acid ; that is, the gum acts as a preservative. There is no doubt that further scientific improvements on the process will perfect the system to such an extent as to enable the British spinner to use it safely and with confidence.

It is obvious that the addition of these processes means extra charges to the spinner and an increase in the cost of the yarn, both of which are detrimental to the profits of production and in some cases act as discouraging agents. Competition in this branch of the industry will be keenly felt by the English spinner after the war, and therefore it will be incumbent on him to use more economical methods. In the presence of objectionable defects in the raw material, the amount of production, that is the total output becomes less, and that reacts on the supply of yarn for the weaving industry. The chief aim of the spinner after the war will be to increase his output to keep the other sister industries in equilibrium, and to diminish the cost of production in order to meet the competition in the world market. The only method by which he can produce on a large scale and apply the " law of diminishing cost," is to have perfectly satisfactory supplies of the raw material.

A very important point in connexion with the problem of " output " is the " final yield " from waste silk. As a matter of fact, the prosperity and the profits of the spinner depend largely on the yield from any quality of silk waste. If he pays high prices for the raw material and receives low yield in the end, evidently he is working under unprofitable conditions. If, on the other hand, he gets a pretty high yield from an ordinary waste, his output increases and his profits rise proportionately. It is therefore of considerable interest to the spinner to buy wastes which in the long run give him a bigger output of good yarn, and not to consume wastes which give a comparatively small quantity of spun yarn.

For purposes of an accurate comparison, we shall consider (*a*) yield of silk after " boiling off," and (*b*) yield of dressed silk. It will be inaccurate to compare yield from wastes in the shape of spun yarn, as a good deal depends on the counts of the thread which bring in variation in quantities obtained from different wastes, and do not give us a proper estimate. The following are the results of a few tests of samples of various qualities of silk wastes showing the yield in two different stages ;—

Weight of Raw Waste.	Name.	Yield after Boiling Off.	Yield of Dressed Silk.
10 lb.	Best Piedmont . . . Gum Waste . . .	7 lb. 12 oz.	6 lb. ½ oz.
,,	No. 1 China Curlies .	7 lb. 9 oz.	4 lb. 11 oz.
,,	Semi-Extra China Curlies	7 lb. 4 oz.	4 lb. 15¾ oz.
,,	Yellow Chassum . . . Kashmir Waste . . .	7 lb. 4 oz.	5 lb. 15 oz.
,,	Extra Selected . . . Opened Steam Waste .	6 lb. 9 oz.	4 lb. 15¾ oz.
,,	Punjum Books No. 3's .	6 lb. 1 oz.	4 lb. 2¾ oz.

From the results of these tests it was found that yellow Kashmir waste (which has been widely used in England) gave a fairly good yield. It comes next to best Piedmont gumwaste which is supposed to be one of the best in this respect. Comparatively speaking, it is very clean and does not require much "picking." A large number of spinners have expressed great satisfaction with this class of waste, specially with Kashmir knubs which they have found very useful for working purposes. If the quality is kept constant, there will be a great demand for them in future.

An interesting fact that came to my notice was the use of Bangalore silk waste by a Huddersfield spinner. Some years ago, a small quantity of this waste (about 2,000 lb.) appeared in the market and was tried by some spinners. This waste was similar in character to Japanese waste and was found quite satisfactory and suitable for spinning purposes. But obviously the export of this class of waste has stopped now and no more quantities have been available in the market for some time. It would be quite a good experiment to re-introduce Bangalore waste in the English market.

We shall now consider the utility and consumption of waste from a manufacturing point of view. Spun yarns are used for general manufacturing purposes, such as sewing silks, weaving yarns, for dress goods, yarns for the hosiery

trade, and more frequently yarns for plush purposes.

For weaving, white waste is preferred, and may be regarded as essential because so many of the woven goods are required for light colours. When a manufacturer buys a yarn made from a certain kind of waste, he does not know the colours his customers will eventually demand, and consequently he prefers to buy yarn which will give the light shades, and he is then on the safe side, as yarn that will give light colours is also suitable for dark colours, whereas if he had his machines clothed with yarn made from yellow waste he could not fill his orders for whites, creams, etc.

For weaving yarns, knubs are used to a large extent. Italian yellow knubs are greatly favoured by the spinners, but, in some cases, Kashmir knubs have been highly appreciated. These are all pure and reliable, and with the exception of removal of cocoon husks, they do not require any extra labour or cost. Continental spinners are the great users of knubs, though in England their use seems to be increasing now.

Gum Wastes (which are all reeling or throwsters' wastes) are specially adapted for yarns for sewing and embroidery silks. They are also used for making yarns for lace and weft purposes. These wastes are strong and lustrous and serve the purpose excellently well. Colour is not of the same importance as for the weaving branch, and yellow wastes are quite satisfactory.

It is interesting to note here that the utility and consumption of silk waste is finding new channels every year. There are at present twenty-one spinners in England, and the approximate production of yarn may be estimated at about 50,000 lb. per week. The present prosperous state of the industry is the result of years of hard struggle, both in the improvement of machinery and methods. The quality of the English spun yarn is already "hall marked" which is shown by the fact that the American plush manufacturer never hesitates to buy it for the manufacture of his plushes. If the raw material is improved and the supply kept constant, there is no doubt that in the near future the total

output would increase twofold and distant markets will be supplied with these spuns. The question of raw waste, therefore, demands a careful study, and in so far as India is concerned certainly improvements must be made in this direction. To put it briefly, what the spinner in this country wants is raw waste free from foreign matter, properly graded, and carefully separated (knots should be avoided and the waste should be as free and open as possible). If the waste were a " perfect " waste, extra labour could be dispensed with, and on this side the yarn would become cheaper, and the seller of waste in India would get more money for it since there would be more of real silk in cleaner waste.

Chapter VI

SUGGESTIONS FOR DEGUMMING OF WASTE IN INDIA

It has been suggested to me more than once that the preliminary process of degumming and cleaning the waste should be done in India. I am inclined to think that there is a good deal of truth and practical wisdom in this suggestion. There are two reasons for adopting this method. In the first place, most of the faults of Indian waste cannot be found until after degumming, and, therefore, degumming on the spot is a check for the quality of the waste exported to this country. Secondly, the increasing cost of labour in England makes it imperative for the British spinner to cut down the number of extra processes and employ only the efficient labour absolutely necessary to ensure a maximum output. Labour is comparatively cheap in India, and as the efficiency required to carry out these processes is not great, they could be easily managed in India and save the spinner a good deal of worry and trouble. But, of course, it depends on the spinners, and one cannot positively say whether they would be willing to accept the discharged waste, because the quality of the yarn mainly depends upon the quality of the degummed silk. If, owing to a peculiar prejudice, the spinners would rather do this part themselves then our scheme acquires a different character. However, there is no harm in trying an experiment, and in this view I put forth the following practical points to help the Indian enterprise.

The process of degumming waste is not so simple as it seems at first sight. There are a number of complications which even experienced spinners lose sight of, and then suffer in the end. It is essential that special attention be paid to the working of this process.

In the first place, it is necessary to appoint a practical man who is thoroughly conversant with the various methods

of degumming waste silk. His knowledge should be *continuous* and perfect so that he may understand the exact requirements of the market.

The next point is to take atmospheric conditions into account. These should be favourable. The nature of water to be used should be fully determined, that is, it should be of a certain degree of softness, or otherwise it would not dissolve the soap. Soap and water should be both studied concurrently. The time required for the duration of the process and the method employed are also of great importance.

Eliminate the crude element in the first boil, in the next boil obtain cleanliness with lustre and strength. Over-degumming and under-degumming should always be avoided ; the former results in the weakness of the fibre and the latter in lack of cleanliness and stickiness in subsequent operations.

With regard to drying, open-air drying is the best, and then comes circulating warm air as a good agent for drying. The degummed silk must not be baked. After this, 11 per cent. of moisture should be properly determined. The silk should be allowed to recover its natural strength and elasticity. Generally, the spinners in this country let it lie for six weeks before dressing it, but in India the time will vary according to climate and atmospheric conditions.

Packing is another factor which requires consideration. I shall discuss this fully in another chapter.

Looking at the problem of sending degummed silk from a commercial point of view one has to remember that the quality at this stage means a good deal. The chief point is to export waste which would be proper for spinning purposes here, having the maximum of *drafting* capacity. This is very important for carrying out the spinning operations successfully.

Of late years, Japan has been exporting degummed waste to foreign countries. Though it was imperfect and defective at first, the quality has been considerably improving since then. This new system is finding favour with some spinners, while others strongly object to it. The latter still insist on using their own degummed silk. If India could manage this

part of the work properly and efficiently, there is no reason why such a system should be discarded. A trial must be given and then one can find out whether there is a market for this class of waste. With the precautions pointed out above, there is every likelihood that the process would be successful, to the advantage of both the exporter and the importer. There is no doubt that there are some practical difficulties ahead, but in all forms of industrial schemes these difficulties have to be surmounted and methods improved in order to increase production or to create a new demand for a commodity. I am fully confident that if this were done in India, there would be no further difficulty with regard to the exportation of Indian waste, and moreover a new industrial field will be created to help other allied industries.

Chapter VII

TASAR WASTE

TASAR, or tussah, as it is commonly known in this country, is also connected with the spinning industry. At present, only very small quantities of hand-reeled tasar are imported either from India or from China ; the bulk of the trade is in tasar waste which is spun in different counts in the central area. Congleton and Brighouse are two great centres for tasar spinning. The general demand in the home as well as in the foreign markets is supplied from yarns produced in these two towns, and it may be observed that the importance of this branch of the industry is much more appreciated now than ever before the war, on account of a practical stoppage of the Continental productions.

Large supplies of tasar waste are received here from China ; or to put it shortly, one may say that China is now the sole supplier of this class of waste. Reports from a number of spinners show that, some years ago, Indian tasar waste was very largely used in this country, but partly owing to the nature of the fibre and partly owing to the lack of organization, this trade has completely gone down, the result being that now Indian tasar waste is not available in the market, though some spinners maintain that there is still a fair quantity used (the consumption of China tasar is supposed to be ten times that of Indian).

With regard to the nature of the fibre, the unanimous opinion of the spinners is that Indian tasar waste gives coarser yarn, that is to say, it cannot be spun into fine counts, and is only adaptable for coarse threads. As compared with China tasar, it lacks elasticity and possesses a shorter fibre in the staple, which defects render it unusable for finer counts of yarn. Its nature is described as " crispy," which makes the finished yarn unmarketable for high class of work so that it cannot compete with yarn made from

China fibre. An expert spinner expressed his opinion to me in the following words :—

"Regarding Indian tussah. Some years ago it was very largely used for plush purposes, but it does not take the same dye as Chefoo tussah (Northern China) and is apparently of a much coarser fibre which does not allow the waste to be spun to the same fine count as Chefoo tussah. As of late years the counts required in tussah have gradually become finer than they used to be, Indian tussah has fallen into disfavour. It is possible that a better selection and better cultivation of the worm which will spin the finest fibre would enable its production to be of more use to spinner."

It is therefore necessary, first of all, to improve the quality of the fibre and then to regulate the supply in order to make Indian tasar popular in the British market. This is, however, a question that belongs to the province of sericulture and must have the attention of the experts on the subject. But it is very probable that by better methods of production and organization the Indian tasar industry could be greatly improved and its extent increased.

We shall now consider the utility of tasar. Let us take raw tasar to start with. As has been previously pointed out, it is hand-reeled and is imported in very small quantities, and is therefore not much used in England. Only a few bales are consumed every now and then. Forty deniers tasar is used for insulating purposes generally and sometimes for making tassels for decoration purposes. One big firm in Macclesfield prepares woven tasar cloth for Indian and Australian markets, particularly for gents' suitings; but the quantities are limited and for statistical purposes we can leave them out of account. Its consumption in India is large, where it is manufactured into cloth to meet the local demand. Owing to its lightness and colour, it is undoubtedly suitable for hot climates, though fairly large quantities of tasar organizine could be used for making blouse pieces and summer dresses. But it is almost impossible to compete with China tasar cloth on account of its cheapness.

As regards spun tasar from the waste, there is a large and increasing demand for it in this country and also abroad.

Two or three firms use the finer counts of tasar for embroidery silks. No. 1 China tasar is, at present, largely used for this class of work, and if the quality of Indian tasar fibre is improved, there will be a great outlet for it in this trade. Great precautions have, however, to be taken in judging the demand in this trade, as mercerised cotton is killing the market for tasar, as artificial silk in the real silk trade. For purposes of competition, prices will have to be properly considered at different periods, and the export of tasar for embroidery silks will have to be regulated by the use and price of cotton at that particular period. The lustre and the natural colour of tasar contribute to its great utility in embroidery silks which would find a ready market in India if they were slightly cheaper than they are just now. It is interesting to note that the use of embroidery silks is increasing every year in India owing to a change in the social conditions.

Another important opening for tasar silk is its use in conjunction with wool. This depends upon two conditions, (*a*) the quality of the tasar fibre, and (*b*) prices of wool. If the tasar waste is spun in coarser counts, it can be mixed with wool for the worsted trade to give the latter the brilliancy and softness of silk, so that even the inferior qualities of yarn can be utilized in some form or other. But this utility to a large extent depends on the current prices of wool, that is, if the prices are high this method can be adopted with advantage. If on the other hand prices of wool are low, and those of tasar stationary or high, this method of mixing tasar and wool does not prove a commercial success.

The most important use of tasar waste in the form of spun yarn is in the manufacture of plushes. At present, more than three-fifths of the tasar spun in this country is consumed by this trade. This is chiefly due to the fact that competition with cheap German velvets and plushes is now at an end, and the British manufacturer has the opportunity of taking up markets abroad, for instance in South America, Africa, and the Oriental countries which were formerly overwhelmed with German goods. Moreover, spun tasar from Germany has ceased to be received in the New York market, which before the war used to consume large quanti-

ties of it. In addition to these exportations to the United States, large quantities of spun tasar are used by a large plush and velvet manufacturing firm in this country. This consumption is steadily increasing now, and it is hoped that the manufacturers of plushes, velvets, imitation furs, etc., will continue to produce these goods after the war. Naturally, therefore, the demand for tasar waste is expected to rise, and if large quantities of good waste are available in India, they will be at once taken up by the manufacturers. As the demand in the American market is for finer counts and stronger yarns, it would be worth our while to improve the Indian production of tasar by means of better control of the industrial organization.

The yield of tasar is generally 55 per cent. or slightly more, and if fineness of fibre is aimed at in production, and its elasticity improved, the commodity will achieve a high commercial utility and obtain a wider market.

Surveying the problem of export of tasar waste from the Indian point of view, we may say that increase in the production of "wild silks" is a matter of economic importance and is directly connected with the economic life of the people in some parts of the country, particularly in Assam. We may admit that there are great difficulties in organizing the industry on properly scientific lines, but it is evident that before we can ever think of commencing and enlarging an export trade obstacles which affect production should all be removed, more by studying the real life of the industrial communities than by forcing strange and unsuitable methods. The example of other countries having similar economic conditions stands clearly before us, and we can hope to benefit by their experience. For this reason a minute study of the Chinese tasar industry will be of immense advantage.

Some of the difficulties referred to are purely of a scientific nature. They have been fully explained by Professor Lefroy in his Report (p. 117) and concern the classification and maintenance of pure races of wild silkworms in India. By a careful selection of the race, we can expect to get a better quality of fibre, and I have no doubt that if steps are taken, these difficulties will be ultimately removed. Suggestions

put forth by Professor Lefroy all tend to show that there is a great possibility of progress in this direction, and their adoption by the authorities concerned means the issue of some good commercial results. In this way the industry can not only be revived but extended as well, and can then meet the increasing demand in the world market.

Other difficulties are of the nature of industrial organization. Proper management and control is essential for any further progress in production. The system of collection of small quantities and other matters concerning packing, etc., will be discussed in the last chapter. The most important point to emphasize here is the organized regulation of supplies which is necessary to keep the export trade in a state of economic equilibrium.

Chapter VIII

THE ERI AND MUGA SILKS

THE other two varieties of " wild silks " are the eri and the muga. They are both particularily Indian productions, and are cultivated in Assam. They are grown chiefly for the home market, and are spun and woven into cloth by women to supply the local demand.

In recent years, small quantities of eri cocoons have been exported to England and France from Calcutta, where these are brought from the villages. So far as England is concerned, only one large firm of spinners has tried the experiment and found it a great success. Owing to its popularity as a good commercial fibre, there is a great demand for it in the English spinning industry.

Regarding the quality of the eri fibre, it is interesting to note, that it is much finer than the China tasar fibre. It spins into fine counts specially in 40/2s. (silk counts). The other sizes it is spun into are 50 and 55/2s counts. Its chief advantage is its lighter colour which takes beautiful light dyes, which ordinary tasar would not take. It is essential that the supplies should be as free as possible from the reddish brown cocoons which sometimes come in the bales. These make the finished yarn darker, and everything which makes the thread darker in shade is a disadvantage. A light creamy shade is the best for all purposes. Apart from this slight mixture of these dark cocoons, the quantities imported have otherwise been quite satisfactory so far.

Another important feature of eri silk that makes it extremely useful for making plushes, hat plushes and velvets, is its power of resilience. It has a greater resilience than white Italian silk or any other that is used in the manufacture of plushes, and is therefore specially suited for these purposes. The " pile " in the velvet or plush made from eri stands beautifully and gives a very fine effect in the

finished commodity. As a matter of fact, it is preferred to Italian schappe or English spun owing to its properties, and some manufacturers would consume as much of it as they could obtain. One manufacturer suggested to me that if by any means, such as selection of a pure race of the worm, the colour could be made still lighter, that is, between the Italian schappe and the present colour of eri, there would be great opportunities of making this silk an exclusive material for plushes, and its demand would rise considerably.

In addition to its use in plush manufacture, it is an excellent material for light cloths for warm climates. Though it has not been extensively used for this purpose so far, there is a possibility of some firms using it for their colonial trade. Its wide use, at present, is impossible owing to short supplies. The firm of spinners above referred to has used more than 5,000 lb. of eri cocoons by this time, but can easily consume about 40,000 lb. a year. Unfortunately only one firm is engaged in the export trade of these cocoons, and even so, it is difficult to obtain the desired quantities.

As I understand, there is no fixed market for cocoons in Assam. Girls and women bring their small lots to the village bazaars and dispose of them to casual customers. For general export purposes, these small lots are not of much importance by themselves, as for big orders large quantities should be collected and sent over to the shipping centre. Moreover, the quantities must be regular and constant, and for this it is essential that an organization should exist having a large capital at its back. There must be a collecting establishment where all quantities (large or small) can be taken in. The rearers should be promised the sale of their cocoons on condition that they can produce a certain fixed amount. Different collecting houses can easily send their supplies to Calcutta from where they can be shipped to England, France, and other countries.

I am thoroughly convinced from my inquiries that there is a large and increasing demand for eri yarns in England, and there is no doubt that a special demand could be created in America where the commodity is sure to find favour owing to its commercial utility. It is of an economic interest to

India to increase the production of these cocoons and to organize the industry in such a way as to be able to send regular supplies every year. I am certain that development in this branch of the Indian silk industry would be of great value and benefit to the country and would maintain her prestige in other countries within the Empire as well as without. The rearers can obtain good prices for their cocoons and if the organization is based on proper lines it is bound to be useful and lucrative. Demand for plushes is nearly a constant demand whether in England or any other country, and as it has been found from experience that eri silk is specially suited for the purposes above explained, the only way to extend its utility and popularity is to increase its production in India and thereby to regulate the supply.

With regard to muga silk, I may say that it is perhaps not so important as eri from a commercial point of view. It is practically unknown in the British silk market, and it is astonishing to find that most of the manufacturers have never even heard this name. If it had been introduced in the market, it might have found some outlet, but it is certain that its general use would have been out of the question.

Its colour is "golden" and the fibre is superior to the tasar fibre, both in strength and elasticity. But for all practical purposes it has to compete with the latter in price, which under the present conditions of production is impossible. It is very dear and it is not likely that prices could be lowered even though there were a great demand for it owing to its good properties. Some manufacturers would like to try samples and see if it can be used, but the problem is whether large quantities can be exported from India at prices slightly higher than those of China tasar. The answer to this question at present is in the negative.

I understand that the area of production is small and quantities produced are just sufficient for Indian consumption (in Calcutta, Dacca, Madras, and other parts of India). It will certainly be of a great advantage to the producer to extend its market within India, where it can be used for embroidery and ornamental goods. "Its natural sheen and colour account for the demand; and probably with better

reeling and larger supplies the demand would be very much increased."

Strictly speaking, there is no demand for muga silk in England at present, owing partly to absence of any previous experiment and partly to the necessity of competition with China tasar prices. But it would be possible to create a demand if supplies were available, but these are uncertain.

In the previous pages I have given a detailed survey of the exact requirements of the British silk industry, and have indicated various outlets for Indian productions. So far, I have not gone into the questions of consumption, prices, distribution and economic organization and also other details affecting the export trade of these silks from India. These points I shall discuss at length in Part III, giving the views of those engaged in the silk trade and also my own suggestions to improve existing commercial conditions, which have been on the decline for the last twenty years or more.

Before proceeding to do that, I shall give an account of my inquiries in France and discuss the various points concerning the utility of Indian silks in that country. This will form Part II of this volume. In addition to these points, I shall devote a few pages to an account of the institutions which have been the means of developing the silk industry in France with a view to showing their importance in India if she is to be a supplier of this important raw material.

PART II

Chapter IX

THE FRENCH SILK INDUSTRY

UNLIKE the British silk industry, the manufacturing branch of the French industry is concentrated. From an economic point of view this concentration may be regarded as beneficial to those who are engaged in it. We cannot deny that such a concentration leads to an efficient control and management of the distribution of the raw material, and also of the various operations that are necessary to maintain the life of the industry. In those countries where the silk industry is scattered, distribution becomes difficult on account of the large area over which the raw material has to be distributed, and the work of setting up a definite organization or board of control to carry out distribution in a systematic manner involves complexities. Individual manufacturers have to depend upon their personal experience which may perhaps be kept secret from the others. In France things are quite different. Raw material is all stocked in Lyons, and the area of distribution being small, there is no difficulty in attending to or understanding the requirements of different manufacturers who are not far apart from each other. Moreover, if there is any new brand of silk introduced into the market, it can be speedily tried by the manufacturers who, if they are satisfied with it, can easily place their order with the nearest silk merchant. In England, where the silk industry is scattered over a wide area, the difficulty of this becomes apparent, as some Indian raw silks are absolutely unknown to the manufacturers in certain parts.

Of course, there are some disadvantages in this system of concentration, which manifest themselves when the mechanism of transport is out of order. For instance, if the industry

is concentrated, the whole area under manufacture is affected when there is any accidental transport difficulty. On the other hand, if it is scattered, only one or two units are influenced by such a disorder; the others receive their supplies as usual. These difficulties are only rare, and can therefore be left out of our present consideration.

The problem of labour is also closely connected with the nature of the industry. As we have seen in the case of the British silk industry, owing to its scattered nature, there is no definite labour force. Each area derives its labour from its small source and the manufacturer has to face the competition continually in the neighbouring labour market. The price he pays for a particular unit of labour is determined not only by its efficiency or grade, but also by the price of labour paid in other industries in the same area. But in France the labour supply is governed by different circumstances. During periods of depression and abnormal fluctuations, it is affected considerably, but in normal times the supply is nearly constant. The price of labour is determined by competition within the same industry. Moreover, there is a body of highly skilled labour which has achieved perfection in art and design after a long period of hard training. This is, in my opinion, the result of the concentrated character of the French silk industry. Efficiency of labour has undoubtedly increased during the last forty years or more. Foreign competition has given this impetus to the French weavers.

Considering the question from the point of view of the worker, we find that in bad times the whole industrial area is affected and poverty is seen most where the silk industry is concentrated and least where it is scattered. A sudden depression in the silk trade leaves no other channel open for the worker in the former case; while in the latter he has a large number of choices for an occupation and can soon find a way out of the difficulty.

Taking the entire situation into consideration, one must say that the balance is in favour of concentration, as there is a large number of moral and material advantages. The greatest advantage lies in the training of labour and in the

enlargement of its capacities, which are always in environments conducive to improvement and can derive benefits from well-established institutions for the general advancement of the silk industry.

Before defining the area of concentration, I shall consider the various aspects of the silk industry in France. The French silk industry is divided into three parts :—

1. Production of raw silk, that is the cultivation of the silkworms, their eggs, and the preparation of the thread.
2. Reeling of foreign cocoons imported into the country.
3. Manufacturing branch of the industry.

The production of cocoons, which was once very important, is principally carried on in the following Departments :—

Gard, in the mountainous region.
Ardèche, in the southern part.
Drôme, throughout the whole Department, except in the mountainous region.
Basses-Alpes, grain producing,[1] especially in the Province of Var.
Lozère, all around the district of Florac.
Sovie, in the environs of Chambèry and in the valley of Isère.
Aveyron, in the environs of Saint-Affrique, and Milhau.
Tarn, near the Department of Hérault.
Tarn-et-Garonne, in the environs of Montauban and Villebrumiel.

In addition to these, there are other small places where cocoons are produced and sent to the filatures, but the quantities produced are comparatively small. The southern province of Var is very important as regards the production of the seed. All along the coast of the Mediterranean there are innumerable mulberry trees. At Cogolin, near St. Raphael, there is a large sericultural establishment where the seed is produced on scientific lines. In so far as the production of cocoons is concerned, the above-mentioned Departments contribute to the supply produced in France. This part of the industry is under the control of the Board of Agriculture, and is practised mainly by the peasants.

Production of the eggs of the silkworm.

Reviewing the French cocoon crop for the last ten years, we find that the harvest has decreased by at last fifty per cent. in that period. This decline, by some, is attributed to fluctuations in weather conditions; but the fact is that the people are gradually abandoning this branch of agriculture. The Government bounties have been unable to stop the rate of decline in spite of large yearly grants.[1]

Next, our attention is drawn to silk reeling. Over and above the quantities of cocoons produced within the country a large amount is imported from the Levant, Kashmir, Central Asia, and the Far East. Marseilles is the centre of importation as well as the centre of reeling. There is a large number of filatures in the immediate vicinity of the town, where cocoons are reeled into raw silk. The system of working in some filatures is very up-to-date, and so far as the quality of reeling is concerned, there is no doubt that the French " raws " excel any other in the uniformity of size and cleanliness.

The reeling industry cannot be said to be flourishing in France. The system of bounties is the same here as in the production of cocoons; but with all this artificial " backing up " there is no progress recorded. This is partly due to the fact that the amount of production of French cocoons is going down every year and the prices for foreign cocoons are rising. Above all, there is the most depressing effect of the action of speculators who absorb all the quantities of cocoons available a few months before hand, and when the harvest is ready raise the prices in such a way as to force the reeling establishments to fall back on foreign cocoons. It may be noted in passing that there has been an enormous increase in the Italian output of cocoons for the last few years, and now Milan is far ahead of Marseilles as regards its stocks of cocoons and reeled silk.

The outstanding cause of this decline in the reeling branch of the industry is the effect of the Far Eastern supplies of raw silk. These are constantly improving in quality and increasing in quantity, and can be used even for the finest class of

[1] The system of bounties will be fully explained in *Economics of the Silk Industry* by the author.

work in France and other countries. The Eastern reeling is becoming more and more perfect, and for this reason the manufacturers are not inclined to pay higher prices for French-reeled silk.

Attempts have been made to resuscitate the reeling industry by means of extra bounties and large purchases of fo eign cocoons. The tendency of the French reelers, at present, is to import all the available quantities of cocoons from silk-producing countries and thus to keep their filatures busy.

This brings us to the third and most important aspect of the French silk industry. Silk manufacturing is particularly interesting in France as the entire industry is concentrated at Lyons, St. Etienne and its environs, and has always enjoyed a high reputation due to the excellence of its productions. A few years ago, when the silk manufactures of Germany and Switzerland were in their infancy, Lyons held the foremost position in the world. The Lyons weaver still stands at the top in so far as deftness in workmanship and efficiency are concerned, though for a long time he had to struggle against competition with foreign goods even in his own country. This ever-growing competition has inspired in the French weaver a spirit of confidence which makes his position stable in the silk industry. In the richer classes of the community there is still a large demand for his remarkable and exquisite creations. So long as this demand is there the Lyons weaver has every reason to believe that his work will be crowned with success.

The manufacturing industry has three distinct branches, each of which differs from the other in its proportionate consumption of raw silk. First is the throwing industry whose importance is significant for two reasons : firstly, because it prepares silk for the loom in the home market, and secondly because it prepares trams and organzines for the British and American markets.

It has been pointed out in a previous chapter that the British throwing industry is comparatively very small, and though the throwsters do their utmost to supply the needs of the local trades, still there is always a surplus demand which must have its supply from other sources. In special

trades such as the umbrella silks, ladies' lace veils, etc., a fair amount of French thrown silk is consumed. Before the war, when labour conditions were not so complicated as they are now, the Coventry silk trade used nothing but French and Italian trams and organzines. This might have been due to the popularity that French thrown silks enjoyed in this country, but is chiefly due to the fact that this branch of the French industry has made great strides in the past. Some people held that this prosperity was due to the 3 franc import duty imposed in 1892. There might be some truth in this opinion, as this duty checked the inflow of foreign thrown silks into France, and thus gave a partial impetus to throwing.

But while passing it may be noted that this branch of the industry is also subjected to fluctuations, as demand for thrown silks increases or decreases with the demand for articles in which they are used. For instance, when muslins and other fabrics made with highly twisted thread go out of fashion, their production goes down in that particular season, then automatically the rate of throwing goes down and the mills lie idle. If, on the other hand, fabrics that need highly twisted silk for their manufacture come into fashion again, there is a greater demand for thrown silks and a greater amount of work for the throwing mills. But this factor of fluctuation does not alter our position, as we are, for the time being, concerned with the consumption and utility of raw silk which remains the same whether used in the raw state or thrown.

Next, we come to the weaving branch of the industry which has always won laurels for the city of Lyons. One cannot ignore the fact that of late years silk is ceasing to be exclusively an article of luxury. A greater percentage of the population in every country is now wearing silk fabrics owing to a general economic prosperity, and this gives weaving a still greater prominence in the world of art and design. As Lyons has held her tradition for years, it is only natural that its position may be maintained and mentioned as one of the foremost in Europe.

Lyons specializes in various grades of silk manufactures,

Muslins take a very prominent place in the list of her productions. Plain silk and figured tissues are no less important from the point of view of beauty of design and quality. These are sometimes mixed with gold and silver to supply the demand of the Eastern market, especially the Levant. Large quantities of mixed plain and figured goods are made for local purposes. In these, silk is used in combination with either cotton or wool. Gauzes, grenadines, crêpes, crêpes-de-chine come next in merit. The United Kingdom holds a high place among the customers of Lyons in these goods, and then comes the United States of America. In addition to these silken stuffs, tulles, lace, braids, and trimmings are also manufactured for exportation to America and other countries. Lyons silk embroideries are also famous for their artistic designs.

There has been a great reduction in the production of these articles since the commencement of the war owing to a general disorganization. The fancy trade is on the wane as its export has been temporarily stopped. As regards plain silk goods, there is not much difference between the present and the pre-war production, as their manufacture is more or less important even for war purposes. Shipping difficulties have hampered exportation to a very large extent and this accounts for scarcity of orders and reduction in the amount of production.

Another part of the weaving industry is concentrated at St. Etienne and its environs. The chief articles manufactured are velvet with satin back or "armure," figured velvets, satin back or all silk "armure," and pure silk velvets. Most of these are exported to Morocco, Algeria, Tunis and India. During the war they have partly taken the place of German goods of a similar nature, and therefore their production has not gone down.

Ribbons are a speciality of the St. Etienne trade. Different varieties are made such as plain, black silk, plain in different colours, and figured silk ribbons. These are partly consumed by the home market and partly exported to Great Britain, America, and some of the European countries. A certain amount of braids and trimmings is also made here,

but the manufacture is not constant, as a good deal depends upon the market demand for these articles. Besides these, elastic tissues of various kinds, ties, and cravates in which silk is used are made at St. Etienne.

The St. Etienne industry is well equipped with special machinery and efficient labour to produce these beautiful velvets and ribbons. But in spite of this equipment, foreign competition, especially that of Basle and Elberfeld, has given it a blow, though not of such severity as to knock it out altogether. A striking feature of this trade is that it is more subject to fluctuation than any other. The use of ribbons depends largely on the spending capacity of the people, and if that is limited, as is the case at present, the consumption of fancy goods such as these is generally dispensed with. The prosperity of the trade in ribbons is therefore governed by those economic laws which affect production and consumption when times are abnormal. Thus the consumption of raw silk in this place cannot be definitely determined by its position in the past.

The Lyons industry however differs from that of St. Etienne in many respects. In the first place, the former has a much greater resourcefulness and adaptability and is always ready to fight against foreign competitors in artistic excellence and variety of design. The second point is that although it is dependent on Paris and other centres of fashion during different seasons of the year yet it can find compensation for the decline of one article in the rise of another to favour. But the case is quite different in St Etienne. It is a more or less exclusive production, and if, owing to a sudden change of fashion, ribbons or braids fall into disfavour, there is no other alternative for the weaver but to sit and wait. Moreover these articles are only accessories to dress and their use may be discarded at any time, which is practically impossible with actual wearing clothes. It appears therefore that a larger range in silk production gives Lyons a better chance for competing with foreign goods and affords opportunities for new creations; while the activities of the St. Etienne looms, being confined to ribbons and velvets, are always exposed to the fluctuations of trade.

Another important difference between the industries of these two towns is in their organization of labour. In St. Etienne and its surrounding country, and in the hill districts of Haute Loire the system of small workshops has long existed. Several members of the family take part in the business and do their work in their own small way. In some cases they work independently, while in others they are engaged by " manufacturers " who have no factories of their own. Labour is divided according to the capacities of each member of the family and production is managed in a very simple way. The reason for the survival of this system is that electric power can be easily adapted to the low-web looms required for making ribbons, without any big changes in the machinery or any special re-construction of the workshop. A small motor is added to give power, and complications of any kind are avoided.

In Lyons, where the manufacturers of piece-goods require re-building of the whole loom for fitting new appliances, labour is organized on the factory system. An individual weaver cannot incur great expenses both in the purchase of the loom and the supply of power, and for this reason he is led to find employment in large factories, which have been built up by joint stock companies or bodies of manufacturers. This striking difference in labour organization reminds me of the old Scottish cottage industry system and is specially suited to industries where simple machinery can be run by a comparatively low horse-power motor without much disturbance in the workers' homes. The greatest advantage in this organization is that even the young members of the family can utilize their spare time in helping the older members, and thus add to the total output in some form or other.

Here we should take the problem of cost of production into consideration. In my opinion, this system of organization explains to a large extent the low cost of production as compared with England, where it is, generally speaking, out of vogue. The low cost of living in the country keeps the wages at a comparatively lower level, and thus weavers can be engaged in their homes at lower wages than they would

accept in big factories in the town. The current charges in a factory run up to an enormous amount, and in the long run, though by a system of "large scale production" prices are kept down, the labour bill raises the cost of production.

In connexion with the weaving and throwing industries, it is advisable to consider the question of distribution of raw silk. Both in Lyons and St. Etienne, raw silk is distributed among the manufacturers by silk merchants who import their supplies from China, Japan and the Levant. These supplies are conditioned at the Lyons or St. Etienne conditioning houses, where various particulars are recorded and notified to the merchants who after verifying the requirements of different trades dispatch the ordered quantities to the manufacturers. Some of these merchants form joint stock companies, while others transact their business in the capacities of a private company. There is no difficulty in distribution owing to the concentrated character of the manufacturing area.

The third and by no means the least important branch of the French silk industry is spinning, that is, the utilization of wastes of various kinds. As has been previously pointed out, the French process of degumming is totally different from the English process, and this difference brings about an essential difference in organization and control. The French schappe process involves the use of large quantities of running water which are easily obtainable in France, and the utilization of which in spinning is not restricted by any sanitary laws. In England, the spinners are prohibited the practice of this method as it is supposed to affect the sanitary conditions of the locality. The difference in the process of degumming does not imply in any way that one process is superior to the other, it is only a difference in method to suit the local conditions.

On account of an ever growing fear of foreign competition, the French spinning industry is now more or less a limited monopoly, though we can hardly express it as working on a trust system. Large and powerful companies have joined together to form a syndicate. This syndicate controls the purchase of the raw material as well as the sale of the

output. The working of this corporate body is based on a certain definite policy and it may be regarded as a sort of secret concern. Individual companies control their own establishments, but matters concerning the whole industry are discussed at the board of the syndicate. This combination serves as a "protection" against outside attacks.

Its particular interest from our point of view lies in the consumption of raw silk waste from various sources. The larger the extent of the industry, the larger is the amount of waste consumed. The French schappe is used to some extent by the English velvet manufacturers and is largely exported to the United States, so that production is expected to increase with the increasing demand. The consumption of schappe is considerably increased by the French manufacturers who use it in making velvets, crêpes-de-chine, foulards, and taffetas.

The industry is concentrated all around Lyons, along the banks of the Rhone. In normal times, there is an abundant supply of labour. The rising wages have tended to increase the cost of spinning to a certain extent. The system of bounties operates in spinning in the same way as in any other branch of the French silk industry. This artificial bolstering is an essential characteristic of the silk industry in France, and may be said to be another form of protective measure in addition to the various import duties on foreign yarns.

Summarizing the present position of the French silk industry, we find that three facts stand out clear. First is the progressive decline in the production of cocoons in France in spite of the system of bounties. This may be attributed to the growing competition of the Far East where the quality of reeling is considerably improving every year and prices are still comparatively low (as compared with the European silks) on account of labour being cheaper in China and Japan. Another reason for this decline is the indirect influence of prices of silk in the New York market which is constantly rising in importance to the detriment of the Lyons and Milan markets. Larger supplies of raw silk now go to America from China and Japan which means that the increasing

demand in the French market is not adequately met with. I have emphasized this fact particularly to show that if at a period like this when consumption of silk is increasing everywhere, India's resources in this direction are developed to their full extent, there are great possibilities of supplying this increasing demand in Europe.

The second fact is that though formerly labour was very cheap in France, as compared with England and America, now there is a visible rise in wages in every branch of the industry owing to a change in the economic conditions of the country. This difference in the price of labour results in raising the cost of production. But the most important change effected by labour is in the choice of the raw material. In those countries where labour is dear, the manufacturers are compelled to buy raw silk which gives them quick winding so as to reduce the cost of working, while in countries where labour is cheap, the manufacturers pay more attention to the price of raw silk than to its working qualities, because cheap labour does not increase the cost of winding to such an extent as to lower the profits of the manufacturer. But the fact that the difference in the price of labour in different countries will ultimately become less and less makes the problem still more complicated, and forces us to the view held in a previous chapter regarding the improvement in the quality of raw silk.

The third fact (which showed itself in rather gloomy colours before the war) is the effect of German and Swiss competition. There is no doubt that, for a number of years, the French silk industry maintained its superior position against continued attacks of cheap goods of foreign origin, but at last the effect of this underselling began to be felt by the French manufacturers. A larger output, a more modern plant, and a better control helped the new rivals in competing with articles of the French looms which though superior in quality and design could no longer stand the dumping of goods at low prices. However, it may be said of the French industry that its brilliant survival deserves admiration and praise. Even the latest competitor has tried its utmost strength and found that the Lyons and St.

Etienne industries are still strong enough to consume large quantities of raw silk. As a matter of fact, a prominent Lyons merchant told me that consumption of raw silk will greatly increase in France after the war and new sources of supply will be welcomed and received with great satisfaction.

I think it will not be out of place here to say a few words about the competition of artificial silk in France. In recent years, processes of preparing artificial silk have been greatly developed. To increase production and to keep prices at a fair level, various companies using different methods have now consolidated into a form of trust. This combination has helped to this extent, that while before, individual companies determined their own prices to suit either the demand or their profits (to compete with others), now they have decided to keep prices in equilibrium by a mutual consent. But our problem is to find out how far this branch of production has affected the consumption of real silk.

On a review of my inquiries from various sources (both merchants and manufacturers) I find that the case is somewhat different from that in England. There is no doubt that there is a certain amount of replacement of real silk by artificial silk, but it is not so great as to cause an alarm. Each has its own province, and strictly speaking, their distribution and consumption follow different lines. A well-known silk merchant in Lyons said to me, " Real silk will always be real silk," implying by his statement that in spite of the most up-to-date improvements in the artificial silk fibre, the use of real silk will remain as firm as ever. So that, so far as France is concerned, the problem involving the competition of these two fibres with each other is practically negligible at the present time.

Above I have given an account of the French silk industry, indicating, wherever necessary, its striking features which distinguish it from the British industry ; I shall now proceed to examine the requirements of the French silk manufacturer and spinner and show how far Indian productions (both raws and wastes) can be introduced into the market.

Chapter X

UTILITY OF INDIAN "RAWS" IN FRANCE

THOSE defects in ordinary raw silks which increase the cost of production of the finished commodity, affect its quality and limit the scope of utility of the raw material have already been fully discussed in Part I. It would simply be an unnecessary repetition to dwell on these defects separately here. The properties which distinguish a good raw silk from a bad one are the same in every case. If a certain kind of raw is regarded as inferior to another in England it must be regarded in the same light in France, though a difference in the commercial and economic conditions of these two countries may alter the range of its utility. For instance, owing to a higher labour bill, a manufacturer in England cannot afford to pay heavy winding costs, and is compelled to use raw silk which gives him the maximum satisfaction in winding and throwing. On the other hand, a manufacturer in France is working under different conditions. His labour bill is comparatively less, and if certain defects in the raw silk raise the price of working, in the long run he is still producing a commodity cheaper owing to this great difference in the price of labour. But the fact that his output is also restricted by a bad raw material cannot be denied. Moreover, difference in the price of labour makes no difference in the quality of the finished article, and therefore, looking at this problem from a general point of view, we find that in so far as defects in the raw silk are concerned, the French manufacturer stands in the same position as the English manufacturer does, except perhaps in minor points.

Another point which remains to be studied is the present day policy of the silk manufacturer in France. There is no doubt that he is struggling against changing conditions both economic and social. He produces goods only when he receives orders, and in order to supply the market demand he has to increase his output considerably at a certain period

of the year on account of a sudden rise to fashion of that particular commodity. If, at this period, he happens to use defective raw silk which diminishes his output, he is obviously working under unprofitable conditions, perhaps to the detriment of his business prosperity. It is essential for his personal interests to use good raw silk which helps him to supply the increasing demand of the market in silk goods.

Passing from general considerations to particular cases, we are at once face to face with facts of a practical nature. We saw in the case of the British silk industry that defects such as lack of cleanliness, and absence in uniformity of size in raw silks, not only increase the cost of production in silk manufacturing, but also render the finished goods unmarketable for certain purposes. These defects operate in a similar manner in the French industry and cause similar disturbances in the system of manufacturing. But other defects such as the percentage amount of *gum* in raw silk and its colour do not matter so much in the French as in the British silk trade.

The question of gum does not appear to be at all serious in France. The leading members of the Lyons silk trade maintain that difference between percentage of discharge in various kinds of raw silks is so small that it can be easily ignored at present. For instance, even the best Italian may lose between 20 and 22 per cent. in "boil off." It is compensated by a comparative difference in their prices and the ultimate result is pretty nearly the same. It is, therefore, unpractical to attach too much importance to this point, which completely disappears when we take the net cost of producing an article into consideration.

Looking at the same question from the transport point of view, we find that its importance is minimized by its being practically a negligible quantity. Some silk merchants hold that when a certain quality of raw silk contains "too much" gum, they have to pay more in freights and transport charges. There is evidently an exaggeration in this statement, because, as already pointed out, the difference between percentage discharge of two different raw silks is never so great as to alter their net weight to a great extent, and thus

make the shipper pay different rates for different grades of silk. An eminent firm of shippers (Messrs. Chabrières, Morel & Co.) in Lyons gave me valuable information regarding this point, and told me that in so far as transport charges are concerned, presence of gum makes no difference in the rates paid for " raws " imported from foreign countries.

With regard to the colour of raw silks, the French manufacturer holds a different view. He is convinced of the practical utility of the modern processes of degumming and bleaching, and considers it desirable to produce yellow silk, the reason being that almost 95 per cent. of the cocoons produced now-a-days in France and Italy are yellow and give yellow raw silk. For all practical purposes, yellow silk is quite suitable to the French silk industry, and the fact that there is a great scope for white " raws " does not in any way decrease the commercial value of yellow " raws." Speaking generally, we may say that in the French silk market, the yellow colour of raw silk is no hindrance in the way of its sale, and therefore its production is just as useful as that of the white.

The object of my examining the above point is to show the difference between the requirements of two different markets (that is the British and the French), and to point out that while in England Indian silks are *sometimes* rejected by the manufacturer owing to their yellow colour, in France this distinction is practically insignificant. As the entire supplies of " raws " from Kashmir and Bengal are yellow, it is satisfactory to know that their colour will not hinder their consumption in France if other points that make silks suitable for manufacturing purposes are in their favour.

Let us now consider the problem of utility of Indian raw silks in France directly. So far as my inquiries go, I find that Bengal silk was once largely used in France. But owing to the causes which led to its downfall in England, it is falling into disfavour in France as well. Formerly it was used in the manufacture of goods which required lightly twisted thread, such as certain kinds of furniture silks, but at present its consumption is going down on account of lack of supplies.

It is unanimously held by silk merchants and manufac-

turers in Lyons that Bengal "raws" will always have a very limited demand in the French silk market. This is chiefly due to the fact that the silk is soft and spongy in its nature. Lack of tenacity and strength make it unsuitable for the manufacture of goods which necessitate the use of high speed machinery involving a great amount of tension in the thread. This view is undoubtedly correct so far as the production of goods which require highly twisted thread is concerned. But then there are other articles in the trade which require either "no throw" silk or silk which is only lightly twisted. I am confident that if a slight improvement is made in the present fibre of Bengal silk and if the area under cultivation is increased so as to get a bigger and more constant output of raw silk there will be no difficulty in enlarging the extent of its consumption. I have learned from different sources that the winter bunds of Bengal silk always find a better market than the summer bunds. If this is the case why not produce more raw silk in the winter months and keep the supplies for export purposes regular and constant?

The other Indian raw silk which was introduced into the French market a few years ago is Kashmir silk. It is used much more in France than in England, where its consumption is only limited. It is interesting to note that its increasing popularity in the former country is an indication of the extent to which it can be used in high class silk manufacturing. During the first few years of its consumption it was used mainly for weft purposes but now it is used in the warp as well. The following extract from a letter from a Lyons silk merchant shows how Kashmir silk is beginning to establish its reputation :—

"Raws from Kashmir are beginning to be known in Lyons and really esteemed by our manufacturers who use them thrown into tram and organzine. They are excellent organzine in competition with Syrian silk and second order Italian filatures. Average evenness. The touch of the Kashmir silk is quite peculiar. It seems not to be muscular, if we may say so, though it is quite satisfactory on the loom. The cleanness is a good average one and sufficient as it is. The weak point is the winding,

which is very poor and causes very high throwing prices, about the double of prices for throwing good Italian raws.

"The consumption of Kashmir in Lyons is increasing steadily and would do so at a quicker step if the winding were improved, because it would lower the cost of throwing the raws into organzine and tram."

It is obvious from the above extract that Kashmir silk is finding an easy market in Lyons, and its use here is not confined to weft only, but has extended to warp also. In other words, it can be used for general dress goods now, and can easily compete with Syrian and second order Italian silks. In the manufacture of muslins and crêpes-de-chine, Japan silk, China filatures and good Italians were formerly used, but now with slight improvement in quality, Kashmir raw can replace them. There is thus an unlimited demand for this class of silk in France. The most important improvement necessary at present, to increase its consumption and popularity, is to reduce the number of gum marks to a minimum. There is no doubt that increase in the cost of winding is due to the presence of these gum-tacks which hinder the rate of winder's work when winding swifts are running fast. Every time the swift stops owing to hard gums in the skein, the winder has to waste time in loosening the silk. On the one hand the output is reduced and on the other the manufacturer is compelled to pay higher wages to the workers. It is, however, satisfactory to know that Kashmir silk does not contain many split or double ends which would also increase the cost of throwing the raw if they were present in large numbers as is the case with some inferior qualities of silks. Moreover, its "non-muscular" touch does not in any way cause trouble in the loom. As a matter of fact, this peculiar touch adds to the softness and brilliancy of the finished article.

The important sizes used in the French silk trade vary from 9/11 to 18/22 deniers, most of which are already offered in the market so far as Kashmir raws are concerned. Here again there is a striking difference between the requirements of the British and French manufacturers. In England and Scotland, fine sizes such as 8/10 and 9/11 deniers are only

occasionally used, but in France these fine sizes are enormously used for the manufacture of muslins and fine gauzes. In the former countries, coarser sizes run up to 20/24 deniers in a large number of trades; in France these coarse sizes are seen only rarely. But in spite of this difference there is a strange similarity in another popular size. Both in England and in France, 13/15 deniers raw is very largely used. So that we come to the conclusion that the most useful size from the manufacturer's point of view is 13/15 deniers, which by no means implies that this is the only size in which silk should be reeled. The proper range for the Lyons market is from 9/11 to 18/22 deniers. This includes all the useful sizes for the British market such as 13/15, 14/16, etc.

Surveying the present situation of the Lyons silk market, one finds that the lack of adequate supplies of raw silk is felt more and more every year. After the war, conditions will change altogether and, when labour is once more reorganized, easy access to raw material will be the only solution for future industrial problems. As the silk industry is one of the most important industries of France, a proper supply of raw silk will be necessary to maintain its stability. China steam filatures, Shanghai silks, tsatlees, and re-reels have always been used to a very large extent. Canton silks have had a good demand during the periods when velvets were in vogue. Kashmir silk has fairly established its position in the market. The only problem that we have now to solve is to increase the production of raw silk in India in order to meet the increasing demand in France.

It remains to investigate the question, what is our criterion? To this question the French consumer gives a very simple reply. He says, "Let the Kashmir silk industry be your model and follow similar lines of development." The answer is apparently quite simple, but its practical application involves difficulties with which every one is not familiar. The conditions which govern the production of raw silk in Kashmir are not the same as in the rest of India, and therefore the same principles cannot be applied to both. There is no doubt that we have sufficient encouragement from recent experiments carried out in Patiala and other places.

The samples of Patiala silk received, and shown to the manufacturers in this country and in France, have attracted much attention and have been found to be very good. If these experiments take the form of a proper industry, it is possible that it will prove a success. At all events, it is necessary that India's resources of raw silk should be developed to their full extent. Though the quality of Bengal silk is not as good as that of Kashmir and China silks, there is still sufficient demand for it in some trades in England and France. If regular supplies are available, consumption is almost sure. In my opinion, "fall to disfavour" means absence of regular supplies. Moreover defects can be easily remedied with an improved system of reeling and grading. When this is accomplished our next step is to organize our export trade and to keep it in constant touch with the prevailing market conditions. This part of the subject I propose to discuss in Part III; but here it is sufficient to say that there is a large and increasing demand for good raw silk in France.

I have given a brief account of the general requirements of the French silk market, and have indicated lines on which Indian silks could be used with advantage. I have purposely avoided details, as most of them have already been explained in a previous section. I shall now pass on to "schapping" and show how it differs from the English process of "degumming" in its essential features, and how it utilizes silk waste.

Chapter XI

SCHAPPING

Utilization of Silk Wastes in France

Schapping is perhaps the most important branch of the French silk industry. It is true that it was practised more than a hundred years ago, but its actual development commenced in 1830. It passed through a series of struggles, and after continued efforts on the part of the French spinners it has now reached a *certain* stage of perfection. This gradual evolution as it may be called has introduced a multiplicity of operations in schapping, intended to realize the best possible yarn. It is obvious that this exclusive devotedness to spinning has increased the amount of capital engaged in it by leaps and bounds. The formation of a " syndicate " of schappe manufacturers (ordinarily speaking spinners) points to the fact that the process is regarded as an essential part of the national silk industry and therefore it is deemed proper to safeguard its interests against the aggressions of foreign spinners. It has to a certain extent achieved its object and established its position.

It is useful to note here that yarns obtained from all kinds of wastes by the process of schapping are called schappes, and the industry itself is known as " the schappe industry." All sorts of wastes are used for the preparation of these yarns. For purposes of classification these wastes may be divided into four kinds.

1. *Wastes from silkworm nurseries.* These include wastes surrounding pierced cocoons, double cocoons and other spoiled cocoons that cannot be reeled, and in France it is known as " blaze." Large quantities of these cocoons used to be imported from Bengal. Some of the pierced cocoons are very rich in silk, containing about 70 to 80 per cent., but the average is nearly 60 per cent. In addition to foreign

importations, French pierced cocoons are also used by the industry.

2. *Wastes from cocoon filatures.* This class of waste is very important and exceptionally abundant. Its mean production in reeling is about 25 per cent. It generally consists of cocoon waste from filatures and is known as "frison." The French, Italian and the Spanish are very similar in character. Syrian frisons used to be imported in large quantities before the war. Shanghai waste and China curlies come under the same heading and are generally used for schapping. In Bengal their production is now going down owing to the closing up of the filatures. The best quality of frisons in France is known as "classique" and those from indigenous filatures are called "demi-classique."

Another source of supply of frisons is Cochin China. The export of pierced cocoons, frisons, etc., is rising every day. Mysore frisons have also been used in France from time to time, and have been found to be quite satisfactory.

3. *Throwing and winding wastes.* The main supply of throwing and winding wastes comes from England. In France it is known as "bourre." Shanghai and Canton send white and yellow wastes, but they are generally mixed with a lot of twisted threads and are not suitable for schappe purposes.

4. *Combing wastes from schappe.* These are known as "bourrettes" in France and as "noils" in England. They are generally used for making inferior qualities of yarns, or for ammunition fillings. Owing to the shortness of the fibre they cannot be spun into good yarns.

Out of the four kinds given above, only the first two are used for schapping. Japan wastes, China curlies, knubs, and cocoons of all descriptions are best suited for the process. As a rule, gum wastes obtained from throwing mills are avoided as they do not lend themselves to any softening process owing to the presence of hard ends and twisted threads. Steam wastes do not find favour with the French spinners on account of hard patches here and there. These patches or lumps cause irregularity in the amount of gum left

in the silk. Knubs are particularly suited to schapping and are used in large quantities in France.

The kind and quality of the raw material required for the schappe industry is practically the same as for the British spinning industry, except for slight differences in minor details. As a matter of fact these two industries do not differ very much from each other. The essential difference is in the first stage of the industry. In England, degumming is done by " boiling off " waste silk and the gum is completely got rid of as quickly as possible, while in France the process of fermentation is used, and a very small percentage of gum is left in the fibre. This difference in the first process is, as has been explained in a previous chapter, the result of local economic conditions. In the former country such a process of fermentation is not allowed, in the latter, perhaps, the process of " boiling off " would raise the cost of production.

A few words may be said about the process itself. The principle involved is the slow decomposition of the gum contained in the waste silk. This is done to maintain the richness of the silk and to keep the fibre as soft as possible. The waste is piled in a heap in a damp warm place and allowed to ferment and loosen itself in the presence of moisture. The pile is constantly disturbed so as to obtain a uniform softening in each and every portion of the waste. This process takes a long time to achieve proper results, and therefore, now-a-days, a quicker method is resorted to. Instead of natural fermentation, water which is kept at a certain definite temperature by means of steampipes, is circulated freely over the waste to soften it properly. Great care is taken to use well-softened water, generally obtained by boiling. In order to get a thorough saturation, the silk is well beaten down and left in boiling water for two or three days according to the nature of the waste used. After the expiry of this period, the silk is properly rubbed between the fingers and mingled fibres are loosened. A simple test is to break the silk ; if it shows fine fibres at broken ends it is taken out for subsequent washing, otherwise it is left in the wooden tanks a day or two longer to get proper soft-

ness. When proper softness is fully obtained, the waste is transferred to different tanks and thoroughly washed in hot water and soap. Loose gum and dirty liquor are extracted by placing the silk in a hydro extractor. It is then subjected to another washing in hot water and beaters are used to loosen the remaining gum and to make the waste pliable. In some cases running water is used to get extra cleanli ess. The object of the whole process is to degum the waste gradually and slowly so as to keep the fibre strong.

Great care is taken to determine the degree of softness of the silk during different stages of the process. It must be remembered that the waste is not completely degummed; a certain amount of gum is left in the fibre. The greater the amount of gum, the cheaper is the yarn produced. A very good class of yarn contains about 3 to 5 per cent. of gum. This more or less exact determination of percentage of gum left in the fibre is gained by constant experience in schapping, and is a matter of great importance to the buyer of schappe, who is supposed to pay a good price for a good yarn and not for one which contains more gum than appears in the description.

The process of carbonization is practised in France to remove the vegetable mixture from the waste, and in so far as the quality of the yarn is concerned it is of a great commercial value. The process has been greatly improved during the last few years, and now its application is becoming more and more widespread than before.

Here I may mention that in addition to different kinds of wastes described above, large quantities of tasar waste are also consumed by the schappe industry. Pierced tasar cocoons and tasar waste used to come from India and China. At present, supplies from the former country are very small and China is now becoming the general supplying store of these wastes. I have already explained the chief defects of Indian tasar waste so far as the British spinning industry is concerned. But these defects will not matter much in France, where labour is still comparatively cheaper. The most important thing is to regulate supply. As regards consumption, even inferior qualities of tasar waste could be

utilized in the preparation of inferior yarns. After all, Indian tasar is not so bad in quality as to be knocked out of the market altogether. It has its properties which can always be made use of. But, of course, if supplies appear in the market one year and then disappear the next, there is no other alternative for the spinners but to fall back on some other substitute.

Apart from the process of degumming waste silk, there is seemingly no other difference between spinning as practised in England and schapping as practised in France. The preparation of the final yarn involves similar processes of combing, roving, spinning and cleaning. There is no doubt that the amount of production of spuns is bigger in France than in England and their use is becoming more and more universal in Lyons and St. Etienne.

Strictly speaking there is not much difference between tissues made from real silk and those made from spun silk. This absence of difference is becoming apparent every year owing to the introduction into the market of beautiful fabrics made from spun yarns. In France, large quantities of spun silks are absorbed by a trade known as " passementerie " which includes lace making, the manufacture of fringes, silk cords, etc. The hosiery and the knitting trades consume sufficiently large quantities for making silk gloves and other articles of common use. A small quantity of schappe is also used by manufacturers of elastic tissues such as braces, straps, etc. The manufacturers of furnishing silks top the list in their consumption of schappe of all kinds.

They are also used mixed with silk, cotton and wool in hundreds of different ways, specially in silks for drapery purposes. The largest quantities are, however, used in making silk handkerchiefs, ribbons, velours and plushes in Lyons, St. Etienne and the surrounding provinces.

There is a considerable increase in the export of schappes (tasar and white) to England and America. Both of these countries consume large quantities of finer qualities of tasar schappes in the manufacture of plushes, imitation furs, and other pile goods. As a matter of fact, this ever-growing increase in consumption is an impetus to the schappe indus-

try, and its importance is becoming more and more significant owing to the widening scope of its utility.

Now there is a fine opportunity for Indian waste to find a favourable outlet in the French market. During the war the demand for waste silk has been steadily increasing and only a part of it has met with adequate supplies on account of shortage of tonnage in shipping. This demand is expected to rise still higher after the war when reorganization of labour and capital will hasten industrial activities. The demand for silk and tasar waste will be in full swing provided unforseen circumstances do not lead it astray. The problem is, how is the surplus demand going to get its supply? Supplies from China and Japan are already drifting to the American market and hence there must be a new source of supply. If India can face this problem bravely, there is no doubt that the surplus demand will be adequately met. We can export waste from India free from extraneous matter such as cotton and vegetable fibres, etc. This waste, if properly graded, is sure to find a good market in France in competition with waste from other parts of the world. It is difficult to estimate the ultimate benefit that India will receive from this branch of her export trade, but it is obvious that the economic return from the exportation of silk waste is an additional contribution to her national dividend with practically no cost of production except that expended in collection and organization. It is, therefore, important that steps should be taken as soon as possible to organize the industry properly and to regulate the supply so as to prepare a strong field for further developments in the silk trade.

Chapter XII

WILD SILKS

Possibilities of their Consumption in France

Among the three wild silks produced in India, tasar silk has already been mentioned in a previous chapter. It is needless to dwell upon it any more here, as its principal properties and usages have been fully discussed before. Regarding eri silk, I am of opinion that there is considerable field for it in France. But as production is only limited at present, it is advisable to popularize it in one market at a time. If we can regularly supply the quantities required for the English market, we are helping towards further production. It has been shown that under the present circumstances India is unable to supply the demand even of the British spinning industry, not to speak of another. If production is properly organized and supplies regulated, the demand in one market will be sufficient to repay our efforts. After the industry has established itself, surplus demand can be adequately met without much trouble.

There is however, considerable interest shown in muga silk in Lyons. Its peculiar golden colour and fineness appeals to the consumers of Shanghai tasar. They consider that there is a possibility of introducing this class of silk into the Lyons market. It possesses more "nerve" and strength than the ordinary China tasar, and this property combined with its external structure will make it perfectly usable for good class fabrics. The sample tested in Lyons gave the following results :—

Size : 38 deniers.

Reeling : very good.

Winding : perfectly satisfactory.

So that muga silk proved satisfactory in every way. At present, stocks of good tasar from China are not available in

the market, and this gives muga silk a still greater importance. But there is a greater difficulty in the way of its export from India. Production is very small, and, owing to a proportionate local consumption, it is very difficult to obtain quantities sufficient for sending out to foreign countries. Moreover, prices are very high, and I do not think a silk merchant in Lyons will be prepared to pay much more than what he pays for Shanghai tasar. This competition will undoubtedly affect the consumption of muga silk in France.

It is possible to bring down prices by adopting a system of "large scale production," but it is doubtful whether, in the long run, this system will prove beneficial to other branches of silk culture in India. For instance, a larger amount of capital invested in tasar or eri may produce better results and hence it may be advisable to adhere to the development of these two in preference to muga silk. It would be interesting from an experimental point of view to see if anything substantial can be done in this direction. The question of finding a market is not very complicated; it is the questions of production and export that present difficulties in this case.

Chapter XIII

SALE OF COCOONS IN FRANCE

In continuation of my present investigation, I may discuss suggestions received in Lyons relating to the sale of cocoons in Marseilles. I have mentioned in a previous chapter that the production of cocoons in France is in a progressive decline. This presents an alarming situation to those who are managing the filatures and are responsible for the yearly output of cocoons. Various methods have been adopted to check the progress of this decline, and at present it is difficult to say which of these methods will prove efficient. One of these is the importation of foreign cocoons. This might have brought about a change for the better, but owing to the war, supplies from the Near East and Central Asia ceased to reach France, and a part of the plant had to lie idle again. It is therefore considered important to discover new sources of cocoons and to keep the plant running in the interests of the reeling industry.

At a meeting of the Lyons Chamber of Commerce, I discussed this problem in its various aspects with the members present. The Vice-President of the Chamber suggested that India should start with the growing of cocoons on the best practical lines under expert management and should export them to France. He pointed out that there was always an unlimited market for cocoons at Marseilles. The advantage of this method, he said, was that by improving cocoon-production the State or the producers could be sure of realizing profits from their capital sooner than if they invested large sums of money in filatures and reeled silk which was defective and unsuitable for a foreign market. In short, the profits would be readier, surer, and sooner in the case of cocoon-production. There was no doubt, he maintained, that cocoons would sell more readily than raw silk both in France and Italy, where there was a shortage of cocoon stocks.

Stated briefly, the chief points of the argument may be summed up as follows: (1) There is a lesser investment of capital to start with; (2) less efficiency is required to produce cocoons; (3) results achieved are visible sooner than in the case of raw silk; (4) profits realized come home to the producer sooner and perhaps more in the case of cocoon than in the case of raw silk; (5) there are fewer complications in the management and production of cocoons than in the filatures; (6) a market is almost sure, especially at present and after the war, when there will be a scarcity of cocoons.

The system suggested above is very good, but is applicable only to new areas of production. It is true that, when an industry is in its infancy, there should be a minimum multiplicity of operations. Each stage should be developed in its turn, especially when each forms a part by itself and can make the industry realize its profits. Therefore, so far as new areas are concerned, cocoon-growing will certainly benefit those who are engaged in it.

The hidden discrepancies of this system appear when we take those areas into consideration where silk is already produced. If these areas confine themselves to cocoon-production, there is no chance of utilizing the existing plant and filatures. We cannot give employment to those whose livelihood depended upon it formerly. Only the peasants and the agricultural classes can take part in the production of cocoons, which is a cottage industry. The filatures afford employment to labour in general and can make the industry a complete whole. The larger the extent of the industry the greater is the number of sister industries connected with it, and the system of employment is more or less complete within that locality. It is therefore essential that by a system of economic organization, silk producing areas should be made self-sufficient and not maintain their existence merely by producing cocoons for other markets of the world.

Another argument against mere cocoon-production is that, by such a method as this, we are making the silk industry a dependent industry. By endeavouring to increase the production of raw silk in India we are at the same time striving

to stop supplies coming in from China and Japan. If we confine ourselves to the production of cocoons, there is no possible chance of realizing our objective, and on the face of it we are doing what we primarily set up to undo. We are simply depending on foreign reelers for our raw silk. In the first place, we are snatching away the means of livelihood of about 100,000 people employed in reeling, and in the second place we are producing something which is only meant to be exported. Such a system would be detrimental to the future industrial development of India.

There is yet another aspect of this problem which involves financial considerations. It is evident that the sale of raw silk in France gives a bigger monetary return to the Indian exporter than the sale of cocoons and enables him to reinvest the capital in the further development of the industry. If raw silk is reeled in India, the difference beween the money values of these two commodities is represented by the amount of labour and capital expended within the country, and is ultimately paid by the importer. If on the other hand, cocoons are exported, the cost of reeling which includes the wages of the worker and establishment charges are paid by the importer to his own reelers and for the interests of his own country. In one case, there is an increase in the national dividend of India, in the other there is a proportionate loss which is a source of income for the importing country. It is therefore unwise to advocate a system of mere cocoon-production, except under circumstances of a surplus production when it is most desirable to have an extensive foreign trade.

Other arguments, such as the requirement of a high efficiency in reeling, etc., are not valid in India's case. There is a sufficient supply of semi-skilled labour in the country which could be trained to use modern machinery in a few months' time, and could carry out the various processes as efficiently as labour in any other country. This argument falls to the ground when we take into consideration the high reputation that the Indian workman has enjoyed on account of his deftness in handling delicate textile fibres. The process of reeling is quite simple as compared with the

intricate process of weaving those beautiful silk fabrics for which the Indian weaver has become famous all over the world. The problem of efficiency is therefore very easy to solve. The only difficulty, which I have pointed out many times before, is the difficulty of organization. If this is removed, the realization of our industrial objective is not very distant.

After examining the whole situation, I come to the conclusion that our aim should be to make the silk industry as complete as possible. Of course we are not in a position to attempt too much at present, but we can safely foster the existing branches of the industry so as to achieve the contemplated completeness. Having this ideal in view, we should start with perfecting our present system of reeling. If we confine ourselves to the production of cocoons alone, then reeling will be a matter of the future and development will be slow for all practical purposes. We cannot lose sight of the fact that the other silk-producing countries of the world are going ahead. In order to keep pace with the industrial development of other countries, we must organize our industries and attack the difficulties with our utmost energy.

Chapter XIV

MARSEILLES

Organization in a Filature

Marseilles is now regarded as the second largest centre for cocoons in Europe, the first being Milan. The largest importing firm is that of Messrs. Chabrières Morel & Co., who in addition to their business in foreign cocoons store the quantities produced in France and distribute them among the reeling establishments. The reason for Marseilles becoming a cocoon centre is that nearly all the big steam filatures are situated in its environs. The sericultural departments of Southern France are also very near and supplies of cocoons from Var and other provinces are sent to Marseilles for the use of the local filatures. Moreover transport facilities are greater in this case than in any other. As regards foreign supplies, Marseilles stands foremost as a shipping centre and can easily receive large quantities at any time of the year and stock them for the market. The direct shipping connexion between Marseilles and the Eastern countries increases the importance of the former as a centre for cocoons.

Formerly Marseilles was the principal consumer of Kashmir cocoons, and supplies shipped from Bombay were received here, but now they are sent direct to Milan. This change is due, perhaps, to the discovery of a better market.

Now we come to the practical side of the subject, that is the reeling of cocoons. From our point of view it will be interesting to study the system of organization. For this reason I shall give a brief description of the Filatures de la Capelette.

This establishment has a large plant at its disposal, and employs female labour to a very great extent. Owing to a comparative simplicity of operations, labour is divided on proper lines, and each department is controlled by its own superintendent. The whole establishment may be divided into three parts.

The first is the "grading" department where cocoons are

separated according to (*a*) their size, and (*b*) their quality, that is, good and bad, diseased, stained, double cocoons or cocoons with any other defect. These are marked and put into different baskets for distribution in the "reeling" department.

Next comes the "reeling" department which is the most important of all. Good cocoons are reeled separately on one side. Basins containing hot water are arranged in a line so as to make the best use of space in the filature and to enable the power supply to be controlled simultaneously. Different sizes of the raw are reeled from these cocoons. For a coarse size, seven or eight cocoons are reeled off at the same time; for a fine size, five, four or even three are put together to get the final thread. When one of the initial fibres breaks, the girl in charge of the basin at once joins it up in order to keep the size of the raw constant. Variation in size occurs only when the reeler is careless and incompetent. Great care is taken in watching the fibre passing from the cocoon to the final thread.

Inferior classes of cocoons give a very coarse silk varying from 80 to 150 deniers. Silk produced from stained or defective cocoons is generally darker in shade and the thread is rough throughout its length. It is extremely difficult to obtain proper sizes from these cocoons, and that is why the filatures take particular care to grade the cocoons before they are sent up for reeling.

A very important thing in reeling is the amount of waste produced during the process. A very good reeler makes the least possible waste, as the profits of the establishment are raised or lowered according to the quantity of waste made in the filature. The greater the amount of reeled silk, the greater is the output of the reeler in a valuable commodity.

Next comes the drying of the skeins which is a very simple process and only needs a careful handling. After the skeins are dried they are sent to the third department where gum marks are detected and removed as far as possible. The raw silk is weighed, sized and cleaned in the same department. If there are any apparent defects they are at once put right. Larger skeins are divided into smaller

ones and put into " ties " for commercial purposes. These skeins are then numbered and graded in this department ready for sending out.

The organization, on the whole, is simple and does not involve any particular difficulty. There are only three principal departments each of which is managed by a special superintendent who is responsible for the work done in that department. There is no diversity in the operations, and each is closely connected with the other. The method of control is not at all complicated.

As regards efficiency of labour, it may be noted that the operation of grading requires training of a very simple nature. A few months' experience in a filature is sufficient for a fair working knowledge of cocoons. The worker soon begins to distinguish between good and bad cocoons, between diseased and stained cocoons. Grading of sizes is not very difficult. In the reeling department efficiency means a great deal because the quality and the size of the raw silk depends on the deftness and carefulness of the worker. A little neglect on her part spoils the final thread and causes great variation in the sizes of the raws. But the process is not so difficult or complicated as to require long training. Processes in the third department are very simple indeed, and any intelligent person can be taught to weigh the skeins properly or to detect gum marks in a short time.

The importance of this organization can be easily seen by studying the Indian conditions. There are no difficulties in this branch of the silk industry which cannot be surmounted with careful attention. In my opinion organization can be easily perfected by a real spirit of enterprise which is unfortunately lacking in the case of the Indian capitalist. Capital is required to back up the industry, and if that is not forthcoming nothing else can be done. It is therefore essential to equip the industrial enterprise with a reasonable amount of capital and then strive for a perfect organization.

In the next chapter I will give a brief description of the Lyons Conditioning House with a view to showing the great commercial value and service of this institution to the silk trade.

Chapter XV

LYONS CONDITIONING HOUSE

THIS is a very useful institution from a commercial point of view. It is impossible for individual manufacturers to determine the exact properties of the silk they buy from the merchants. The charges for keeping a huge establishment are so great that it is practically out of the question for any manufacturer to carry out the work single-handed. Moreover for the general interests of the silk trade, it is essential to have a public institution which protects the interests of all concerned and prevents frauds in individual cases. This function is performed by the Lyons Conditioning House whose existence is a boon to the French silk industry.

Silk possesses a great hygrometrical power of absorbing or releasing a certain quantity of water. This quantity is governed by the external conditions to which silk is exposed, and with every variation in the surrounding atmosphere there is a variation in the percentage of moisture in silk. This property of silk, if ignored, causes a great commercial inconvenience and sometimes becomes a means of fraud in the trade. Looked at from an industrial point of view, it presents serious consequences. The manufacturer cannot estimate the value of his goods precisely if he has no data to work upon. The weight of the finished fabric is determined by the initial weight of the raw silk used, and if this contains more than the allowed percentage of moisture, the final calculation is liable to grave errors. It is therefore important that the manufacturer should know the exact weight of his raw silk and not the weight which includes an unknown quantity of water.

Experience has shown that the exact determination of this moisture cannot be left to the arbitrary discretion of buyers and sellers, and that it is only an established public institution which can independently and impartially give the desired information to the parties concerned. This dis-

interested position of the institution gives it a national commercial importance.

The object of the Lyons Conditioning House or Bureau de Conditionnement as it is known in France, is to give the silk manufacturers full information as to the exact quantity of water contained in raw silk, and, by comparing it with the normal conditions of its humidity, to determine the true mercantile weight or the "conditioned weight" of silk. This establishment is under the control of the Lyons Chamber of Commerce and is therefore for the benefit of the general public. Conditioning houses in other countries have adopted the same methods of working and have used Lyons as their model.

In addition to the determination of water contained in silk, the Conditioning House gives information concerning the real weight of silk exclusive of packing, etc., the other commercially useful properties such as the size, loss in boiling off, quality of winding, and chemical and physical properties.

The first process is that of exact weighing. The bale under consideration is broken open and the silk transferred to another bale, after which the exact weight of the packing is taken down. The net weight of the bale is got by subtracting the weight of packing from the gross weight of the bale. Afterwards, samples are extracted from different parts of the bale, approximately representing the average hygrometrical state of the rest of the bale. The proportional weight of these samples is generally about 1 to 1½ per cent. of the bulk of the bale.

These samples are then divided into three equal lots and weighed and re-weighed with the greatest precision. One of these lots is kept for eventual control; the other two are separately submitted to desiccation by exposure which is done by hanging the skeins from the beam of a balance in stoves where hot air is circulating, until they gradually reach an absolutely dry state. All the water contained in the silk is driven off by the agents of desiccation, namely temperature and ventilation. The temperature, as a rule, varies for each kind of textile according to its nature and strength.

For silk, it may be pushed upwards to 140° Centigrade without any risk of spoiling the fibre, for wool and cotton it does not exceed 110° Centigrade. As to ventilation, the more intense it is, the shorter the operation will be.

The absolute dry weight of the samples is then noted with the same degree of precision as before, and the relation between the original and the dry weights of the testing lots leads, by calculation, to the determination of the *absolute dry weight* of the bale. The conditioned weight is then obtained by adding to the dry weight the allowed proportion of water, agreed upon for each textile to contain in its normal state. This allowed proportion in the case of raw silk is 11 per cent.

Particulars relating to the net weight of the bale, weight of the sample before desiccation, dry weight of the sample, the absolute dry weight of the bale, addition of 11 per cent., and the conditioned weight of the bale, are given on a ticket delivered to the parties concerned. A duplicate of the same is kept in the Conditioning House for reference.

The next operation, also carried on in the Conditioning House, is " boiling off " or decreusage de la soie, as it is known in France. While the former process is important from a commercial point of view, this is useful for manufacturing purposes. As already stated, raw silk loses a certain amount of its weight after boiling off or degumming. This is due to the fact that the exterior envelope of the silk thread is a kind of gummy matter which is soluble in a solution of alkali even diluted, or in boiling soap water, and after the raw silk is subjected to the process of degumming, this natural gum forms a solution and leaves the silk white and bright.

The results of experiments given in a previous chapter show that the quantity of gum in raws is variable according to their colour and origin. The object of " decreusage " is to boil off the gum and all other extraneous substances which may have been added to it, and to give the manufacturer information relating to the percentage of loss in weight thus obtained, so that he may know exactly how much real silk he is handling.

The actual operation of " boiling off " is carried out on systematic lines in the Conditioning House. Some samples are taken from the bale and are weighed absolutely dry (after the method explained above) ; then these samples are submitted to the action of two successive baths of boiling soap water, each containing a weight of soap equal to 25 per cent. of the weight of the silk. The time allowed is generally thirty minutes for each bath. The silk is then washed with lukewarm water, so as to get rid of the soap and the gum. This is then dried and weighed in its anhydrous state. The loss in " boiling off " is obtained by the difference between the absolute dry weights of the samples, before and after the operation.

Information relating to the result of the experiment is given to the party concerned who knows the actual amount of silk at his disposal. As silks are always boiled off before dyeing, it is necessary to know this loss in order to estimate the exact quantities handed over to the dyers or the weavers. With regard to the presence of extraneous matter other than the gum, the silk is subjected to chemical analysis which is the only means of ascertaining the amount and the nature of such substances.

The next important operation is that of size-testing which is much simpler in character than the two described above. It consists in determining the thickness of the thread, and in knowing the variation of the sizes of the raw silks. The calculation is based upon the weight of a fixed length of the fibre, and therefore a thread of silk which for the same length weighs double another is twice as coarse. Raw silk whose size is to be determined is wound off on a swift, and a uniformly adopted length of 450 metres is measured off by means of an automatic meter fixed to the axle of the swift. This length is then weighed and expressed in half decigrams, that is $\frac{3}{4}$ of a grain. Thus when one says that a silk thread sizes 20, it means that 450 metres weigh 20 half-decigrams. This is now universally expressed in deniers which means the same thing, the process itself is known by the name of titrage.

The elasticity and tenacity of silk are determined by means

of an instrument known as the serimetre. The principle involved is that of vertical extension by means of a very small stretching force. The silk thread is attached to the upper end of the instrument which is equipped with a graduated scale for reading the stretching force while the thread is in tension. At the lower extremity of the upper graduated scale in the same vertical plane, there is another index fixed along the length of the instrument. This index gives the movement of the thread while under tension. The stretching force is indicated by the upper scale and elongation is shown by the lower index. When breaking takes place, the instrument stops itself, the upper scale gives the breaking load by which tenacity is determined, the lower index shows the elongation and thereby determines the elasticity of the thread.

The elasticity is expressed in percentage elongation of a thread of 50 centimetre length, and tenacity is expressed in grams weight of the breaking load. These results are related in a ticket in a similar way as in other tests and a copy of this is handed over to the party concerned and another kept at the Conditioning House.

The other tests conducted in the Conditioning House are: Winding of raw silks, and the determination of twist in thrown silk.

Chemical analysis of silk is conducted in a research laboratory which the Chamber of Commerce added to the Conditioning House in 1884. This laboratory is a very useful part of the institution, as it is intended to supply the silk industry with all the information which it may need. In addition to the chemical department, there is an experimental reeling apparatus fitted in it in order to study the comparative qualities of different races of cocoons, and to inquire into their commercial values.

Besides the laboratory, there is a very interesting silk museum attached to the Conditioning House which possesses a large collection of silk-producing moths. This collection is valuable not merely from a scientific point of view, but also from an economic point of view, as it indicates the future possibilities of sericultural development in the world and

affords opportunities for the study of new species, so far unknown in the commercial world.

It is impossible to exaggerate the benefits of these institutions to the French silk industry. From a commercial point of view, undoubtedly, the Conditioning House is a necessity for the welfare of the silk trade, but from a scientific point of view, the other branches of this institution are interesting as well as valuable.

A similar institution in India on a smaller scale would not be without interest. Many objections have been raised to the establishment of such an institution, but considering the present silk trade of India one may say that these objections have no practical importance. For instance it is held that at present all the raw silk exported is conditioned either at Lyons or at Milan and therefore the establishment of a conditioning house in India will not be of any practical utility. Moreover the export trade is so small under the present circumstances of production that an investment in a big conditioning house will be an additional burden to the State without any return. This is true in so far as our export trade in silk is concerned. But this argument does not hold good with regard to the development of the silk industry in India, and also in the case of the large imports of raw silk into India.

Taking the average quantities in lbs. for 1913–14 into consideration, we find that India imported more than two millions and a half of raw silk from other countries. Most of it is consumed in India for the manufacture of silk fabrics, only a very small quantity re-exported. This shows that India's import trade in silk is very large. As a matter of fact, there is a yearly increase in the value of this import trade, and for the present there is no possibility of checking the inflow of raw silk into India. If consumption is increasing or is expected to increase still further for many years to come, it is essential that there should be a proper organization to develop the industry and to protect the interests of this trade. There is no doubt that the weaving branch of the industry which consumes these imports of raw silk is scattered all over the country, but this does not mean that it should

remain in that condtion for ever without any definite organization to look after its commercial and industrial interests. A progressive decline in India's exports of manufactured silks is due to the fact that the manufacturing branch of the industry is gradually dying in all parts of the country. There is no corporate body nor a properly defined organization to stop the decline and work up the revival of that beautiful art which lived in India for centuries. The ever-growing tendency to standardize textile fabrics and other commodities in Europe and America does not give India an opportunity of competing with silk goods from other countries where now hundreds of yards of cloth can be produced of the same pattern and same quality throughout. This system of production is the result of a perfect organization of the industry.

How can this object be achieved and how can the European demand be met when there is no commercial body to start with? The presence of a small conditioning house at Calcutta or at Bombay would lead to a better control of the imports of raw silk. It would prevent arbitrary variations in trade dealings, and the weavers and the manufacturers of silk goods would be supplied with raw silk of a definite size and quality by which they would be able to produce uniform goods for a particular market. At present the manufacturer has no definite data to work upon. A village weaver produces cloth and sells it to the city merchant, who in his turn passes it on to another middleman and finally perhaps to the exporter. The same piece of cloth varies in quality from part to part, and when it appears in a London West End shop it is regarded as an Oriental curio and not as a proper wearing material. This could all be avoided by a systematic control and distribution of raw silk to the parties concerned. If the manufacturers or the weavers knew that a raw silk of a certain denier and certain strength and elasticity would produce cloth of certain quality they would use the same kind of raw material throughout and ultimately produce the required cloth. But if they have to depend wholly on their personal judgment, they are likely to fall into errors which in the long run affect the finished product.

It is perfectly plain that India imports two millions and a half of raw silk, consumes most of it, and has a large silk weaving industry, though it is in a dying condition. In the face of these facts it seems proper that there should be an established organization to revive and foster the dying industry. One part of that organization is the establishment of a conditioning house whose disinterested policy should be to give information to all concerned on matters relating to the silk trade and to help in finding new means of development in that direction. Such an establis ment would not only be a national commercial asset, but would also bcome a source of scientific discoveries relating to the utilization of new species of silk-producing moths of India. The silk industry as a whole would tend to find a wider scope and would establish its position among the other useful industries of the Empire.

A very important consideration in this connexion is that of financing the institution. This is not a difficult matter when looked at from an economic point of view. To some its existence would mean an extra heavy burden to the Treasury, but a study of the Lyons Conditioning House would show that this is not the case.

In Lyons the authorities charge 10 francs per 100 kilos for conditioning the silk. The minimum charge is 5 francs even if the silk to be conditioned is less than 50 kilos. This price is paid half by the seller and half by the buyer. For other tests, such as winding, etc., they pay 4½ francs for fine silk and 3½ francs for tasar. Besides these there are other tests for thrown silks for which the charges are slightly higher. If the average quantities of raw and thrown silk that pass through the Conditioning House during the year be about 15,000,000 lbs. there must be an enormous revenue derived from this establishment alone. The annual report of the Lyons Chamber of Commerce shows the following particulars :—

YEAR 1915

Receipts.

SERVICE DE LA CONDITION DES SOIES. Section II.

Produit de l'exploitation (Revenue) 675,000 francs.

SERVICE DE BUREAU DE TITRAGE DES SOIES.
Section III.
Produit de l'exploitation (Revenue) . 108,000 francs.

Expenditure

SERVICE DE LA CONDITION DES SOIES. Section II.
Total des dépenses ordinaires d'exploitation 403,500 ,,

SERVICE DE BUREAU DE TITRAGE DES SOIES.
Section III.
Total des dépense ordinaires d'exploitation 97,900 ,,

RECAPITULATION

	Section II.	Section III.	Total.
Recettes	675,000	108,000	783,000
Dépenses	403,500	97,900	501,400
Excédent des recettes . .	—	—	281,600

The above statement clearly shows that during the year 1915 there was an excess of 281,600 francs of receipts over expenditure. Owing to the war, the quantities of raw and thrown silks that passed through the Conditioning House during that year were comparatively very low, which points to the fact that in peace times this excess of receipts over expenditure would be still greater. So that the establishment gives a revenue to the Chamber of Commerce in addition to its great commercial value. It is not a burden to the State but is a source of revenue.

A conditioning house in India would have plenty of work to do. In addition to the 2½ million pounds of raw silk imported, there is another 1½ million pounds produced in the country for home consumption. This quantity is fairly large, and if even half of this were submitted to a conditioning house, there would be sufficient revenue to justify its existence. At any rate, it is certain that even under the present circumstances, a conditioning house in India would at least pay its own expenses and would not be a financial burden to the Government. Its commercial and scientific

utility would be a substantial return which if weighed by money value will far exceed the initial outlay. There will be a great improvement in the silk industry owing to the presence of research laboratories connected with the conditioning house, and general organization both of the trade and the industry will tend to perfection.

In the previous sections of this volume I have dealt with various problems connected with the utilization of Indian raw silks in Great Britain and France and have indicated the lines on which they could be popularized in the market. In the next section I propose to discuss the problems connected with the prices of raw silks, their consumption and the organization of the export trade. The last named is the most important part of our work in so far as the foreign market is concerned.

PART III

Chapter XVI

DETERMINATION OF PRICES

THE problem of prices is much more complicated than it appears at first sight. Under the ordinary conditions of commercial transactions, demand and supply play a very important part in the determination of prices. But it always happens that these conditions never remain constant, and the result is that there is an alteration in the order of factors that govern the prices. What we generally call normal conditions are really the ideal conditions in the silk trade, as under these conditions only are supply and demand supposed to be in equilibrium.[1] But this is not the case, even throughout one complete year, as production of raw silk is not regulated by human agency alone. Nature rules the law of production and climatic conditions display different reactions in different seasons. If conditions of temperature, humidity and rainfall are favourable, the crop of cocoons goes up and the output of raw silk will increase provided conditions governing the supply of labour are normal. If there is an excessive rainfall or extremes of temperature and humidity, production goes down no matter what human appliances are introduced to counteract their action.

So that the production of raw silk is governed not only by the supply of labour or its price, but also by natural climatic conditions, and hence its supply is not a constant quantity. Variations take place even in so called " normal times," and therefore normal conditions of supply are only ideal in so far as a given amount of capital and labour are concerned. A similar phenomenon is observed in the case of demand ; the

[1] The expressions supply and demand have been used in the ordinary business sense and not in the strict technical economic sense throughout the present and succeeding chapters.

only difference being that while in the former case nature rules production, in the latter society plays a part which is analogous to nature's reaction. The demand for raw silk even in " normal times " is not a constant quantity. Social conditions, such as an increase in the general prosperity of the consumers of silk fabrics, a sudden change in fashions, involving popular use of silks and an enormous rise in the prices of the textiles may all increase the consumption of silk and thereby raise the demand for raw silk. On the other hand, conditions such as reduction in the spending power of the consuming public, a general drift of fashions into cotton and woollen garments or the use of another cheaper substitute may bring down the demand for raw silk. So that both the supply of and demand for raw silk are varying quantities, one depending on natural conditions, the other on social circumstances and therefore they can only be said to be in a state of unstable equilibrium in normal times.

There is no doubt that taking a series of years into consideration we find that the world's demand for raw silk is rising. But that does not apply to a particular season or even to a particular year. There is always a variation, either a rise or a fall in the demand for raw silk. So far as we are concerned for all practical purposes, we have to consider these periodical changes in order to get an idea of the changes in prices.

As demand and supply are not constant quantities, they are likely to react on prices in some form or other.[1] If during a particular year production of raw silk in China or Japan is helped by favourable conditions, the total output rises above the " normal " and supply becomes plentiful. And if at that time demand for raw silk in Europe or America goes down, prices at once fall and importers commence buying under favourable conditions. But if on the other hand there is a corresponding increase in the demand, prices remain stationary and the market becomes balanced. If owing to some unforeseen circumstances supply becomes

[1] It is also true that even if demand and supply were constant quantities they would react on prices. But for the present we are leaving those conditions out of account.

low and demand remains stationary or rises above the previous demand, prices rise considerably and the market becomes more or less arbitrary. Prices are therefore governed on the one side by supplies available at the moment and on the other side by a variation in the demand for raw silk.

There are two other factors which must be considered before coming to a definite conclusion as to the determination of prices by the "law of demand and supply." These are (*a*) the effect of the American demand on the price of raw silk, and (*b*) the effect of stock-holding on the market conditions. The first of these two factors is becoming more and more alarming to the Continental consumer on account of the rising consumption of raw silk in the American mills. The American silk industry is enlarging the scope of its activities every year and raw silk is finding a prominent place among the textile fibres used in America. This expansion points to the fact that more capital is invested in silk manufacturing now than ever before. The latest improvements are being made in the existing plant and machinery and more is added to it every year. So that the demand for raw silk is rising in the New York market. This rise in demand is accompanied by a stronger hold of America on the Eastern silk market, and as the American manufacturer is keen to increase his output by a better system of organization, he is ever desirous of purchasing good raw silk and will pay higher prices in order to obtain a maximum output from his mills. This tendency results in high prices. It is much more advantageous for him to pay higher prices and buy a good "running" silk than to pay lower prices and buy raw silk which runs badly and affects his production. It is, therefore, obvious that the American demand for raw silk is raising the prices of Eastern raw silks and may perhaps continue to do so for some years. The effect of this rise is being felt by the French importer who is anxious to discover other sources of supply. But it seems to me that if quality were maintained it would be difficult to check the rise in prices as the real increase in demand is faster than the real increase in supply.

Figures relating to the world's production and consumption of raw silk in 1912–13 show that America was the largest consumer. Out of the 60 million pounds constituting the world supply in that year, 54 millions, that is, 93 per cent., were consumed. Of this amount America imported nearly 28 million pounds or 52 per cent., slightly more than half. But the important thing worth noticing is an increase in her Eastern importations and a decrease in the imports of European silks in a period of seven years from 1906 to 1913.

PROPORTION BY COUNTRIES OF RAW SILK IMPORTED IN 1906 AND 1913.[1]

Countries.	By weight per cent. in 1913.	By weight per cent. in 1906.
France	0·3	2·8
Italy	8·6	22·1
Chinese Empire.	21·8	16·4
Japan	68·1	58·1
Miscellaneous	1·2	0·6

Within that period European silks have decreased from 25 per cent. of America's supply to about 10 per cent., while the Chinese supply has increased from 16 per cent. to about 22 per cent., and Japanese from 58 per cent. to 68 per cent. This increase of Eastern silks in the American market is going higher and higher every year, and is playing a very important part in the determination of prices of these silks in Europe.

The second factor is also of a considerable importance so far as prices are concerned. Literally speaking, stock-holding is equivalent to speculation in the silk trade. When supplies of raw silk are abundant in the Eastern market, importers buy up all the available stocks and hold them till market conditions are in their favour. Then comes a sudden rise in demand and the sellers take the first opportunity to raise the prices, thereby compelling the manufacturers to be

[1] *Silk Essays*, page 55.

ruled by their arbitrary action. If at that particular period a certain class of silk is in the swing of fashion, the manufacturer wants to make the best of it and takes orders on the expectation of receiving his supplies of raw silk from the merchant. The holder of stocks takes advantage of the situation seeing that there are no other supplies available except his own and raises prices according to a rise in demand. Stockholding is thus a factor which reacts on the prices of raw silk and is peculiarly connected with the question of supply and demand.

Among other factors which govern prices of raw silk are (*a*) quality and (*b*) utility. The former is a general factor and plays an exactly similar part in the determination of prices of all commodities. The better the quality of raw silk, the higher is the price the manufacturer pays for it. For instance, a raw silk which gives very poor winding and possesses a fluffy fibre fetches about 10*s*. or 12*s*. per pound, while another which gives very good winding and has a fine clean and uniform fibre fetches 20*s*. to 30*s*. a pound. In the one case, cost of winding and working is added to the price of raw silk, in the other, this item is very small and does not raise the price of raw silk for general manufacturing calculations. So that the quality of a certain kind of raw silk determines its price for the manufacturer and his further estimate depends largely on this initial price.

Improvement in quality, in almost all cases, is followed by an increase in price. Taking the example of Kashmir silk, we find that in the beginning its dull appearance held a rise in price back, but later on when this defect was remedied up went the prices. A manufacturer writes :—

"We used this a good many years ago, when it was first introduced as a substitute for Bengal silk, and found it very satisfactory. At that time it was a dull silk, which the reelers found difficult to dispose of for that reason, and as this defect did not matter to us we should have gone on using it, but the reelers found a means of brightening it and the price immediately went up considerably, until it is now quite a high class silk with the result that as far as we are concerned the price rendered it prohibitive."

It is obvious, that a change in the quality resulted in a change in the price. In all classes of raw silk this factor operates in a similar manner. For instance, there is a difference of 3*s*. to 4*s*. a pound between Japans and Bengals owing to a difference in quality. Mysore silk, which is superior in quality to Bengal silk, is marketable at the same price as Japan silk. In order therefore to obtain higher prices for Indian silks, it is necessary to remedy the defects which render them cheap, and maintain a standard of quality for a favourable market.

Next we have to consider the relation between the utility of a certain kind of raw and its price. For instance, Bengal raws are largely consumed by the Leek sewing silks industry in this country and in the manufacture of cheap ribbons in France. There is, therefore, a limited demand for these silks, or in other words, the scope of their utility is limited; prices in this case are thus governed by the range of utility. If the range could be extended, prices could also be raised.

But then there is another subordinate factor here which gives expression to the limit to which prices can move. This is the use of another raw which can be or is largely used for the same purposes. In England, in the manufacture of crêpes and sewing silks, large quantities of Canton silk are used at present. This is evidently a replacement of Bengal silk which ceased to appear in the British market in sufficient quantities. Now, so long as the quality of Bengal raws remains the same and their utility is limited, their prices will be ruled by the Cantons or cheap Chinas which replace them. So that in future, if Bengal silk is to win back its former place, it must compete with Cantons in prices, and for the manufacture of goods of that character the price of Canton silk will determine the price of any other silk used for the same purpose.

In the case of Kashmir raws, prices are determined by another class of silk. In England there is a fair demand for Kashmirs, which can be used in the manufacture of crêpes-de-chine, crepoline, and for the weft in high-class piece goods. In France, as I have said before, there is an unlimited demand for them in various manufactures, and their utility is there-

tore great. These silks therefore can compete favourably in prices with Japans 1½ and Italians, which are at present used for this purpose. Broadly speaking, we may say that prices for Kashmir will be something between Japans and Italians in England, and in France they will be determined by the prices of China silks which are at present largely used for purposes for which Kashmir silk is used. The prices of Kashmirs, therefore, cannot be fixed at a definite rate and must move up or down with the prices of Japans or second order Italians (according to market conditions prevailing at the time).

Another factor which indirectly affects the prices of raw silk is the competition of other textile fibres, such as mercerised cotton and artificial silk. If the prices of these fibres rise considerably above the normal average and tend towards those of raw silk, the result is that there is a greater demand for the latter. If this demand continues increasing and raises consumption for some time, the prices of raw silk begin to move upwards. Though ultimately this rise in prices is affected by an increase in demand, the origin is the rise in prices of those textiles which are replaceable by silk. This factor is not very important and does not cause any disturbance in the market as its action is rare and occasional.

With regard to the prices of waste silk, similar conditions of supply and demand hold good. It has been observed from an experience of the market that there is not so much variation in the prices of this commodity as in those of raw silk, which is due to the fact that it is a by-product and must be exported in order to be of any use to the Eastern producer. There is no doubt, however, that its prices are governed by the amount of supplies available at a certain period. For instance, at present when there is a great demand for waste and supplies are not available, or at least difficult to ship, prices have gone up enormously. But this rise in prices may be attributed mainly to war conditions.

The reaction of demand on the prices of waste is considerable. With every increase in the extent of the spinning industry there is a corresponding increase in the demand for waste silk, or in other words, there is a greater utility for it.

Naturally, therefore, it possesses more commercial value now than before, and hence a rise in prices. This is a very important consideration specially on account of an ever increasing demand for fabrics made from spun silk. It is of a great advantage to the Indian producer of raw silk to keep his waste clean and well-graded so as to increase the quantities of export and to receive good returns for what he would have otherwise thrown away.

The quality of waste also plays a significant part in determining its prices. Freedom from extraneous substances means that the spinner has practically no extra labour cost to pay for cleaning and picking. By saving his labour bill he is in a position to pay more for the raw material. So that prices of wastes are determined by their quality, by which is meant cleanliness and freedom from foreign matter. A comparison of prices shows how quality determines relative values.

China Steam Waste. . . .	at 5/9 per lb. [1]
Italian Waste	at 6/– ,,
Italian Knubs.	at 5/6 ,,
Kashmir Knubs	at 5/3 ,,
Indian Waste (mainly Bengal). .	at 2/3 ,,

When giving me these approximate prices, a spinner said to me that he would far rather pay 6*s.* per pound for Italian waste than buy Indian waste at 2*s.* 3*d.* a lb. as the former would be cheaper in the long run. His complaint was not meant to show that there was a great difference in the quality of the initial fibres of these two kinds of wastes, but was meant to show that there was a great difference between the labour costs of the former and the latter. If the latter was exported clean and free from mixtures of all kinds, prices would at once rise to 4*s.* a lb. as in the case of Kashmir knubs for which the spinners paid 5*s.* 3*d.* a lb. and found it perfectly satisfactory. An extra amount of labour in India in cleaning and picking would double the price of waste in England and France.

[1] The prices quoted above are June, 1917, prices; they have risen a good deal since then.

As regards prices of eri cocoons, there can be no definite law applied to them, as production is small and export trade is just beginning. If there were a general competition between buyers in the market, prices would be governed by the law of supply and demand, but as it is only occasional export, prices are more or less arbitrary on both sides.

Generally, prices of these cocoons vary from Rs.90 to Rs.120 per maund when exported. The average so far has been about Rs.95 per maund. But there will be a greater variation if large quantities were available.

The principal factor which plays an important part in the determination of the final delivery price of raw silk, tasar silk, or any other kind of silk in Great Britain, France or any other country is one which we have not considered so far. It is the effect of what may be shortly described as transport charges. In order to study this we have first to define the various items that make up this final price and then to examine the changes in each so as to obtain the net result.

Before proceeding further I should state exactly what I mean by the final delivery price. It is that price of raw silk, tasar silk or any other kind of silk which the manufacturer pays at his works. It is made up of several items. The first item is the cost of production which concerns the exporter of raw silk in the producing country. Taking a series of years into consideration we find that there is not much variation in this item, the reason being that in the Eastern countries wages do not move up or down so suddenly or so often as they do in the European countries, and therefore the cost of production of raw silk does not vary much during the year or even in a number of years. Other factors in production also remain nearly constant and therefore the total cost of production generally shows little variation. So far as the manufacturer in this country is concerned, slight variations in the cost of production (if there may be any) do not affect the final delivery price and therefore this item may be safely left out of account.

The profits of the middleman and the exporter in the producing country also enter into the final delivery price. The effect of these two is to raise prices but only when they

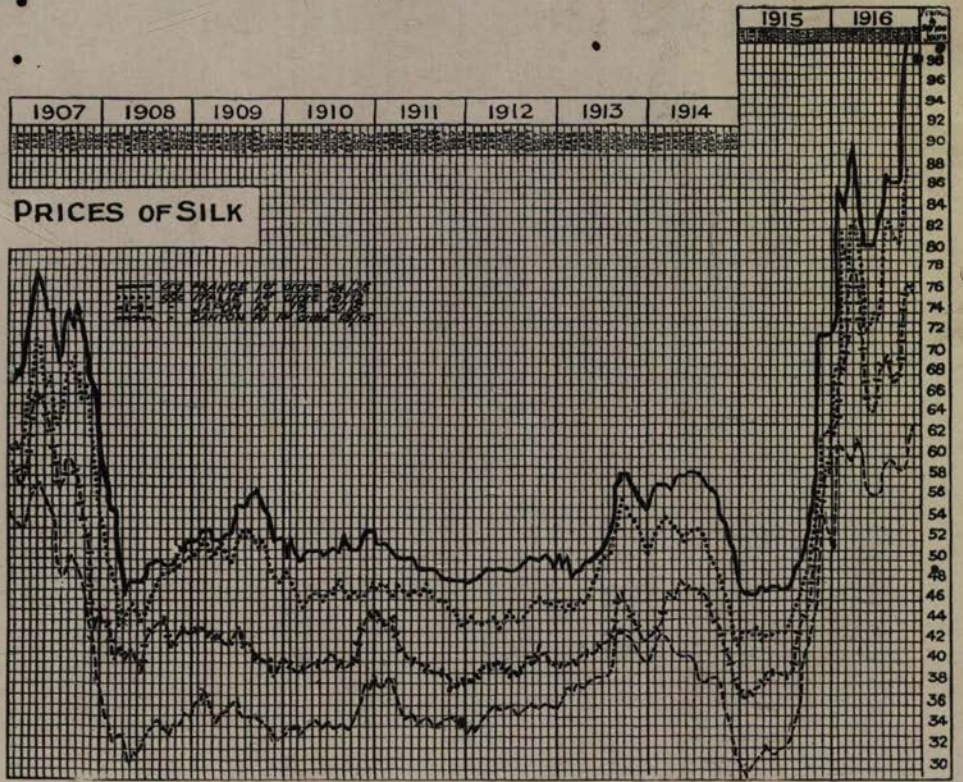
are exorbitant. Generally these profits are regulated by custom and previous practice, but sometimes they are arbitrary and when they are determined in the latter way they raise the final delivery price by about 1 per cent.

The most important of these items is the effect of the transport charges on the final delivery price. These charges include dock charges in the exporting country, carriage, insurance, freights, dock charges in the importing country and minor cable charges. As a rule, in normal times, these charges appreciably enter into the final delivery price. In war times, owing to shipping difficulties and shortage of tonnage, a large percentage of the rise in prices is due to a considerable rise in these charges, and that is why it is necessary to examine them. The shipping difficulties will continue to react on the prices of goods exported from the Eastern countries even after the war, and the manufacturer in the importing country will have to pay more for his raw material than he did before the war.

With regard to the exportation of raw silk from India, it may be anticipated that difficulties in shipping will become less after the war, as all the available merchant shipping will be utilized for export and import purposes. It would be misleading, at present, to estimate the entire cost of transport or to give an idea of the share of the above charges in the final delivery price as there are no constant fixed rates in war time. Freights and insurance are variable quantities just now, and a good deal depends on the shipping companies. Moreover the State control of shipping has been the means of limiting the export and import trade of the country. So that present circumstances may be considered to be exceptional, and a rise of 50 per cent. to 100 per cent. in the transport charges may be regarded as an abnormal factor in the final delivery price of raw silk. This, however, does not imply that in normal times this factor has no importance. Its significance is always great and it may be concluded that about 20 per cent. or more of the final delivery price is the cost of transport even in normal times.

Profits of the merchant or the middleman in the importing country do not rise above 5 per cent. If the number of the

To face p. 117.


1907
1908
1909
1910
1911
1912
1913
1914
1915
1916
PRICES OF SILK
98
96
94
92
90
88
86
84
82
80
78
76
74
72
70
68
66
64
62
60
58
56
54
52
50
48
46
44
42
40
38
36
34
32
30

intermediary bodies is more than one, the final delivery price is raised by a corresponding amount. This, of course, depends on the state of commercial organization and will be fully discussed in the last chapter.

Above I have examined the various factors which govern prices of raw silk, tasar silk, or any other kind of silk, and have indicated briefly how each of these factors affects the market conditions. It is impossible to set down a definite law regarding the future prices of Indian silks that may be exported to Great Britain or to France. I have explained all the important relations between raw silks and their prices, and it is sufficient to add that prices will be determined mainly by the future market conditions which are themselves subject to the factors named above.

It will be interesting to reproduce an extract from a Graphic Chart of Prices of Silk published by Messrs. Chabrières Morel & Co. of Lyons. It shows variation in the prices of 1st order French organzine, Italian raw 1st order 10/12 deniers, Japan fil. 1½ 13/15, and Canton fil. 1st order 13/15. Taking the last ten years into consideration we find that after a big rise in prices of all silks in 1907, which was due to a general speculation, prices kept fairly steady till September, 1913, when the effect of American consumption began to show itself in a general rise in prices. Prices have been going up since 1913, and now they have reached a high level. This enormous increase in 1915 and 1916 was due to a very large consumption of silk in America, a fall in European production, and difficulties of transport and production. Kashmir silk and cocoons obtained very good prices in 1915 and 1916 owing to a decrease in the European crops and a rise in prices in general. But the prominent fact is the growing consumption of raw silk in America and its subsequent effect on prices.

This brings us to the subject of Consumption of Raw Silk and Silk Waste in Great Britain and France. Prices are closely related to consumption and a consideration of the latter will bring out points which are common to both and have a similar bearing on the silk trade.

Chapter XVII

DETERMINATION OF CONSUMPTION

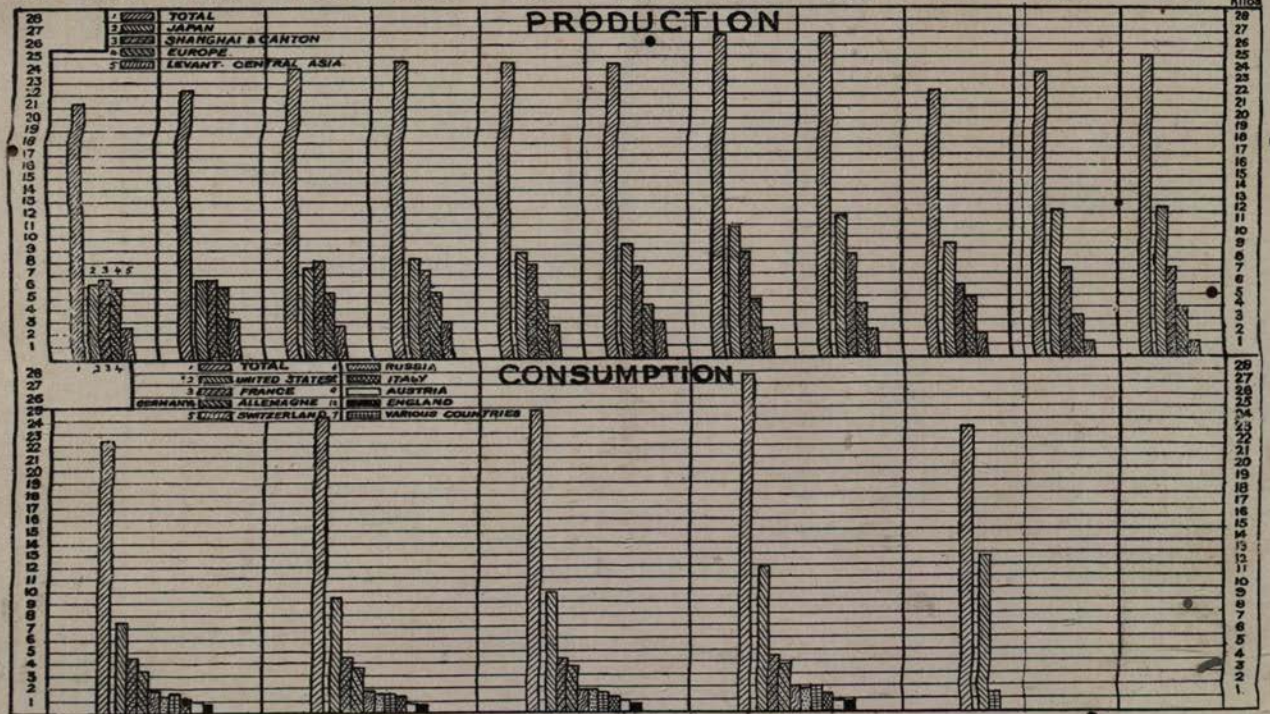
As already explained, prices are directly related to the demand for raw silk in a given market. This relation does not stop here. With every increase in demand there is a corresponding increase in consumption which is therefore related to prices in the same manner as demand.

The consumption of raw silk is progressively increasing every year, owing to a growing demand for silk fabrics. But this increase is in the total consumption of the world. If we take each country separately into consideration, we find that in some countries consumption is steady, in some it is decreasing, while in some it is increasing enormously. This variation in consumption of raw silk in different countries may be attributed to their relative economic conditions. For instance, during the present war, owing to a general mobilization of labour and capital in England, France, and Italy, the consumption of raw silk has gone down, but in America[1] a considerable increase is observed. On the whole, a decrease in one country is compensated by an increase in another.

Again the total increase in consumption is balanced by the total increase in production. Before the war, the world's production of raw silk was progressively rising and its consumption was also increasing at the same rate. It appears, therefore, that the world's silk resources are not limited and are always capable of increasing. In a similar manner the world's consumption of raw silk is not limited, and in the words of a famous silk merchant, " France alone could consume the whole of the Chinese supply." The graphic representation of production and consumption on the opposite page clearly illustrates this point.[2] From 1907 right up to 1913 production has been steadily increasing.

[1] This was specially the case before America's entry into the war.
[2] Published by Messrs. Chabrières, Morel & Co., of Lyons.

To face p. 118.


Millions of Kilos.
1906
1907
1908
1909
1910
1911
1912
1913
1914
1915
1916
PRODUCTION
1 TOTAL
2 JAPAN
3 SHANGHAI & CANTON
4 EUROPE
5 LEVANT. CENTRAL ASIA
CONSUMPTION
1 TOTAL
2 UNITED STATES
3 FRANCE
GERMANY ALLEMAGNE
5 SWITZERLAND
6 RUSSIA
7 ITALY
8 AUSTRIA
9 ENGLAND
10 VARIOUS COUNTRIES

The world's total supply of silk is moving upwards at a constant rate. These figures show only the exports to foreign countries and do not take into account the large quantities of raw silk used in China, Japan and India. The shortage of supplies in 1914, 1915 and 1916 is due to difficulties of transport and other unforeseen circumstances, and therefore these years may be regarded as abnormal.

On the other hand there is a steady increase in the world's consumption of raw silk. In this increase the American consumption has played a very important part. Consumption of raw silk in France has been fairly steady and comes next to that of the United States. It is expected that the French consumption will regain its former position after the war.

So far we have been considering consumption generally. Now we have to find a relation between two particulars, namely, the Indian production on the one side and the British and the French consumption on the other. This can be done by first examining India's silk resources and then finding out how much silk is consumed in England and France.

The first part of this inquiry involves complications. It would be inaccurate to judge India's silk resources from figures of exports of raw silk, as only a part of the silk produced in the country is exported. In the absence of exact information we have to depend on approximate figures which have been compiled by different investigators. The most reliable of these figures are those given by Professor Lefroy. In a paper read before the Royal Society of Arts on February 15, 1917, he gave the following figures with regard to the production of silk in India :—

Province.	Green Cocoons.	Raw Silk.
Mysore	15,360,000 lb.	1,152,000 lb.
Madras	5,000,000 ,,	400,000 ,,
Bengal	8,000,000 ,,	600,000 ,,
Assam	—	12,000 ,,
Burma	—	15,000 ,,
Kashmir	2,640,000 ,,	96,000 ,,
Punjab	12,000 ,,	1,800 ,,
Total	31,012,000 lb.	2,276,800 lb.

These figures show that while there is a fairly large silk-producing industry in India and its resources are by no means limited, out of a total of more than two million pounds in weight of raw silk produced in India only a very small quantity is exported to England and France. The following figures give an idea of the export trade in raw silk to Europe.

EXPORT OF RAW SILK FROM INDIA (LYONS FIGURES)[1]

Year.	Kilos.	lb.	
1912–13	168,000	369,600	1 kilo=2·2 lb.
1913–14	115,000	253,000	
1914–15	50,000	110,000	
1915–16	95,000	209,000	
1916–17 (probable)	120,000	264,000	

Average (for the last five years) 241,120 lb.

It is evident from these figures that in the first place there is a gradual decline in the amount exported, and in the second place only about 10 per cent. of the total production is sent to Europe. Had it not been for Kashmir silk these quantities would have been practically negligible, but as it is, Indian silk still has a place on the list of European silk imports.

Several reasons have been given for this decline, and it is

[1] Extracted from the Annual Statement published by Messrs. Chabrières, Morel & Co.

needless to repeat them here. Our main object is to give an estimate of the British consumption of raw silk and see if a part of her needs can be supplied by India. But before going into that question I may add that, in addition to more than two million pounds of raw silk, India produces about three million pounds of waste which could be collected for export purposes. Out of this large amount about 73,000 lb. of waste is made in Kashmir alone on account of a large production of raw silk, and about a million pounds may be attributed to Bengal; the rest, about a million pounds or more, is due to an extensive silk industry in Mysore and Madras. This enormous amount of waste if properly graded and cleaned could easily feed the English spinning mills. But unfortunately, as in other things, organization is lacking and a part of these quantities is never brought to light.

With regard to the consumption of raw silk in England and Scotland, exact figures are not available owing to the more or less mixed nature of silk manufactures. In addition to pure silk fabrics there are others which contain silk in some form or other. This mixing of goods renders the estimate to some extent inaccurate, but for all practical purposes an estimate based on individual inquiries would serve the purpose. During my investigations I took good care to find out quantities annually consumed by individual manufacturers. These quantities represent a fair average for the last five years and do not take the present conditions into account.

Approximately, 2,500,000 lb. of raw and thrown silk is consumed in Great Britain during the year. This quantity represents a total amount and includes that used with cotton, wool, or any other textile fibre. It is interesting to note that the production of raw silk in India nearly corresponds to the consumption in Great Britain. If even one-third of the British consumption could be satisfied by the Indian supply, there would be a great benefit to both the countries.

As regards consumption of waste silk in England, I have already mentioned that there are about twenty-one spinners in the country who use more than five million pounds in weight of waste. The total output of spun yarn is increas-

ing in England owing to the growing demand for fabrics made from spun silks. An increase in the American consumption of these yarns for plushes and velvets has given the British spinner an opportunity to consume more and more of waste silk. The above consumption includes tasar waste and eri cocoons. The estimated yield is about 50,000 lb. of yarn per week. A comparison of this consumption with the figures of imports of raw silk, waste silk, and thrown silk given in the Annual Statement of the Trade of the United Kingdom will show the significance of my approximate estimate.

Figures given here are for five years from 1911 to 1915.

IMPORTS OF RAW SILK, WASTE SILK AND THROWN SILK (FROM 1911 TO 1915)

Years.	Raw Silk in 1,000 lbs.	Waste Silk in 100 cwts.	Thrown Silk in 1,000 lbs.
1911 . . .	1,238	732	1,086
1912 . . .	1,199	686	1,213
1913 . . .	970	556	1,054
1914 . . .	1,031	480	716
1915 . . .	1,465	459	762
Mean . . .	1,181	583	966

The total average import of raw and thrown silks according to this table amounts to 2,147,000 lb. and that of waste silk to 58,300 cwts. or 6,529,600 lb. This average should be regarded as low because in the first place there is a sudden drop in raw silk in 1913 and also a decrease in 1914 owing to political changes and the war. Taking these facts into consideration, my estimate does not seem to be far out.

With regard to the consumption of raw silk and waste in France, we have one or two more things to consider. These are first of all, the production of raw silk in France, and secondly the yield of cocoons imported from foreign coun-

tries. There is another factor which affects consumption to a small extent and that is the export of thrown silks from France. But for our purposes it will be sufficient to take into account the quantities of raw silk and waste imported into France and those exported from the country. A difference between importations and exportations will give a rough estimate of consumption.

IMPORTS AND EXPORTS OF RAW SILK AND SILK WASTE (FROM 1911 TO 1915)

France. From *Les Tableux de l'administration des Douanes* (*Commerce Spécial*)

Years.	Raw Silk.			Waste Silk.		
	Imports in Millions of Kilos.	Exports in Millions of Kilos.	Retained for Consumption in Millions of Kilos.	Imports in Millions of Kilos.	Exports in Millions of Kilos.	Retained for Consumption in Millions of Kilos.
1911	7,071	1,989	5,082	12,299	2,412	9,887
1912	7,424	1,883	5,541	12,142	2,996	9,148
1913	7,545	2,437	5,109	11,294	2,745	8,549
1914	5,202	2,111	3,091	9,210	1,076	8,134
1915	4,764	2,494	2,270	4,247	1,094	3,153
Average	6,401	2,183	4,281	9,838	2,064	7,774

These figures also are slightly below the normal average owing to the inclusion of two full years of war during which both the imports and the exports went down and consequently affected consumption. The average consumption according to the above table is 4,281,000 kilos or about 9,300,000 lb. in the case of raw silk and 7,774,000 kilos or about 17,102,000 lb. in the case of waste silk. The first average even in the presence of imports and exports during the war may be regarded as correct, as a part of it is again exported to other countries in the shape of thrown silk.

The French consumption, both in the case of raw silk and waste silk is about four times that of the British.

It is obvious from the figures given above that India's net production of raw silk and the waste is small as compared with the consumption of these two commodities in Great Britain and France. But there is no doubt that India could play a very important part in this trade if her resources were properly utilized and her commercial organization improved. In the next chapter I will consider the latter part of the subject in its different aspects.

Chapter XVIII

COMMERCIAL ORGANIZATION

(*a*) Preliminary

Next to production, commercial organization is the most important factor in any industrial development. In our case, when production of raw silk leads to its export trade, it is essential that such a trade should be carried on on certain definite lines so as to harmonize with the interests of the consumer. It is impossible under any circumstances to regulate the supply and to keep the demand satisfied without proper control of the export trade and distribution. Organization is the basis of harmony in both the cases, and it is, therefore, in the interests of the exporter to know the essential requirements of this organization.

If the export trade is in a state of confusion, and the exporter is concerned only with the collection and the shipping of the raw material without any consideration of the market to which he is exporting his raw material, the result will be a gradual decline of the trade. But if, on the other hand, he has a thorough knowledge of the looms of the manufacturer and knows the sizes of the swifts, the latter uses for winding, etc., he is in a better position to adapt his skeins according to the requirements of the machinery used in the manufacturing country. This adoption of certain definite methods on the part of the exporter saves the manufacturer a good deal of unnecessary trouble and expense and helps the trade in general, and ultimately results in an expansion of the export trade in that commodity.

In addition to the above, there are other considerations involved in the proper organization of the export trade in raw silk. These are all very important and contribute to the perfection of the system of organization. Grading and standardization of raw silk and waste silk are of the utmost

importance both to the exporter and the importer. Proper packing facilitates shipping and saves the manufacturer a good deal of trouble. These points should therefore, receive the attention of the exporter.

In the following pages we shall discuss these factors of commercial organization in detail and also examine the subject of finance and control.

(*b*) Grading and Standardization

It has been pointed out in a previous chapter that in some cases raw silk imported into this country comes in large skeins, without any specified grades. This absence of gradation means that the manufacturer has to employ an extra amount of labour to sort it into different qualities and then to grade it according to size. Generally large skeins of Cantons or any other silk that comes in this form have to be subdivided into small skeins and graded so as to distinguish coarser sizes from finer sizes. Obviously, this process involves extra labour and becomes an item in the cost of production.

A similar thing happens in the case of Indian Wastes. Two or three different qualities are packed in one bale without any grading. In some cases, white and yellow are both sent together and when the bales reach the spinners they have to employ labour to sort them and to separate the white from the yellow. In the first place, the spinner has to grade the different kinds of wastes in order to determine the quality required for a particular kind of yarn, and in the second place, he has to waste time and labour on " picking " and sorting.

From the exporter's point of view, the absence of gradation means a loss to himself and the producer. When two or three qualities of a certain raw commodity are mixed in one, the price obtained for the whole is generally based on the price of the lower quality, so that the exporter is getting low prices even for the best grade which has been mixed with other inferior grades. This loss is, as a matter of course, transferred to the producer of the raw commodity. In the

long run, therefore, the producer is the victim of a bad system.

It is essential under these circumstances to find out a method by which a loss to the producer on the one hand, and an extra expense to the manufacturer on the other could be avoided.[1] The solution of this problem is quite simple. In the case of raw silk, the filatures must look after the grading of different kinds of raws produced in their establishments. If the silk is hand reeled, it must be graded in a central establishment before it is exported.

The latter case is the more difficult of the two, but not so difficult as to cause anxiety. If buying of raw silk is in the hands of a company, its agents can collect large quantities and send them to the central establishment where they can be sized and graded. There is no special difficulty in this case, and with proper management and control the system can be easily improved. But there must be a large amount of capital to back up the enterprise, as without co-operation it is impossible to control or to finance a big export trade.

With regard to the export of waste silk from India, there are great possibilities of reform. At present there is no definite system of control or organization, and that is why the supplies are either scanty or useless. I have inquired from reliable sources in India about the probable quantities that could be collected for export purposes. These quantities are by no means small, and if properly graded, packed, and exported, could become a source of income for those engaged in the silk industry.

The best method would be to collect all the available quantities and send them to the central establishments in various parts of the country. Each of these establishments should be responsible for its own collection, which should first be cleaned and freed from extraneous matter and then graded according to the quality of the waste. It is advisable to

[1] An added advantage of grading is a quotation apart from samples. The organization of grading American and Canadian wheat clearly illustrates this point. A grain merchant, for instance, sees "Manitoba hard" quoted at a price he thinks cheap and can cable an order without seeing the wheat.

have three grades in all so as to distinguish each from the other in a simple way. That which is perfectly clean and has the longest fibre may be classed as No. 1, the others as No. 2 and No. 3 according to their qualities. So far as possible, each kind must be uniform throughout and maintain that uniformity for each and every bale exported.

It may be noted here that the grading system used in Kashmir, both with regard to raw silk and waste, is quite satisfactory and has proved a success. Raw silk is divided into three qualities and classified as Nos. 1, 2, and 3 respectively. The waste is graded in a similar way, and each grade maintains its quality throughout the bale.

Next we have to consider the standardization of skeins. At the present time there is no real standard of skeins. Each country sends its raw silk in the form of skeins adapted to the reeling machinery. This variation in the size and the form of skein causes disturbance in the processes of manufacture and hinders output in the manufacturing country. It is, therefore, of the utmost importance that a standard should be adopted to suit the requirements of the British manufacturers. There have been many complaints as to the form of reel and lacing in a skein. The following suggestions for standardizing raw silk skeins would be found very useful in so far as winding and throwing in Great Britain are concerned :—

Length : Skein to measure 56 to 60 inches in circumference.
Width : Width on reel to be 3 inches.
Form of Reel : Grant reel or cross reel.
Size : Skeins to contain silk to the weight of 2½ to 3 ounces ; the lighter for finer sizes, the heavier for coarse sizes, but in no case to exceed 3 ounces.
Lacing : Single skeins to be laced through in two places directly opposite each other. Some people suggest " lacing " at three points, but the former is considered to be more convenient than the latter, as it allows the skein to be opened more freely in the dyeing. The most important thing in " lacing " is the necessity of using silk yarn of a light twist. The presence of

cotton bands has caused considerable waste of time and money in dyeing, and it is therefore essential that this grave defect should be remedied. Cotton ties should be rigorously avoided whether for tasar or for white raw silks. This defect is applicable to every silk producing country, and much valuable time and money would be saved if cotton ends could be excluded altogether.

As regards the length of the skein, there is a difference of opinion, which is the result of varying experience. There is no doubt that large manufacturers have " winding swifts " of many different sizes, but that does not imply that a standard length would be of no use. In the case of small manufacturers, the standard length skein would be of great value as they would be able to adopt a certain definite method of winding on standard swifts and would save both time and money.

The form of reel is very important. It has been found from experience that the " cross reel " is very useful for re-winding purposes. The silk unwinds itself very quickly with a minimum number of breaks and does not in any way hinder the output of throwing. The grant reel is just as good and is greatly appreciated in this country.

The weight of the skein is important from the point of view of manipulation. Heavy skeins are not good for winding as they cannot be handled so easily as the lighter skeins weighing about 3 ounces.

It will be interesting to mention here that the Silk Association of America have followed a similar line of standardization of skeins. The following recommendations were placed before the reelers of raw silk in and near Canton in 1909.

IMPROVEMENT OF CANTON FILATURE SKEINS

Whereas the winding of Canton filatures has always been more or less unsatisfactory to American manufacturers, caused by fine ends, double ends, loose ends, hard gummed reel marks, insufficient traverse in the skein, too large or too small skeins of irregular length, etc., and

Whereas these imperfections could be remedied by greater care from the reelers of Canton in preparing their silk for export, and

Whereas, while silk producers of Shanghai, Japan and Europe have in recent years improved the preparation of their skeins, the silk producers of Canton have allowed their quality of skein to deteriorate because of the above mentioned imperfections; now therefore be it:

RESOLVED, That American buyers and manufacturers do pledge themselves to give a decided preference to filatures that avoid the above imperfections, and comply, as far as possible, with the following conditions:—

1. Tie up ends in reeling or re-reeling, and make traverse faster in reeling or re-reeling the silk. Make as near as possible thirty-three crossings of the thread over and back across the skein for fifty revolutions of the reel.

2. Make only single skeins to weigh 2½ to 4 ounces, preferably 3 ounces; and avoid two or more skeins to the hank.

3. Contact points of the reel to be about ½ inch and rounded (as per illustration), so that skeins will have a wider gum instead of a sharp gum with a sharp bend in the thread.

4. Skeins must be laced through in two places directly opposite each other; lacings to be of smooth, fine cotton or silk yarn slack twist.

5. Make skeins 56 to 58 inches in circumference—so that they will fit regular American machinery.

6. Avoid double ends in the skein in reeling or re-reeling.

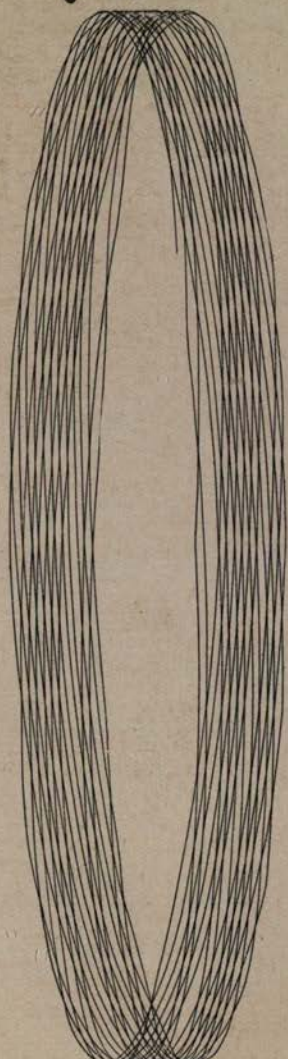
We do further suggest that the system which has improved the working qualities of Japan silks, i.e., re-reeling the skeins if used in Canton, would so vastly enhance the value of Canton filatures that American buyers would gladly pay such additional price for re-reeled Canton filature silks as to more than compensate the reelers, who will inaugurate in their filandas the system of re-reeling their product into standard American silk skeins.

Adopted by the Raw Silk Division of the Silk Association of America, January 26, 1909.

The suggestions of the Silk Association of America given above are really useful from a commercial point of view. I consider that if these suggestions are followed by the Indian producers of raw silk they will prove exceedingly useful to the British manufacturer. I have given the specifications based on my inquiries which I find are nearly the same as

STANDARD TRAVERSE

As Recommended by The Silk Association of America, February, 1902.



133ª

Reproduced by the courtesy of the Secretary of the Silk Association of America.

To face p. 130.

STANDARD AMERICAN SILK SKEIN,

Reproduced by the courtesy of the Secretary of the Silk Association of America.

To face p. 131.

the American silk skein with a slight difference in the length of the skein.

Another thing worth noting is the importance of re-reeling which is very much appreciated by American manufacturers. If such a method were adopted in India, it would certainly lead to a vast improvement in the quality of Indian silks, and consequently prices would rise. This experiment of re-reeling was once tried in France and the result was very satisfactory. As a matter of fact the re-reeled Bengal silk was sold at a higher price than the ordinary Bengal silk (a difference of about 5 frcs. a kilo). It would be advisable, therefore, to re-reel the hand-reeled Bengal silk specially when intended for a foreign market. This would not only increase the prices but would also make the silk more popular than it is at present.

In modern organization, grading and standardization are the two important factors which determine the future extent of the export trade in raw silk and silk waste. These factors should be thoroughly studied by the exporter in order to supply the exact demand of the market.

(*c*) Packing and Shipping

Packing and shipping also form an important part of commercial organization. Their importance is twofold. In the first place there is the necessity of a system, and in the second place there is a consideration of tonnage. Under the present shipping conditions and also under those which are likely to prevail after the war, the question of tonnage is one which demands our immediate attention. Proper packing, by which is meant the proper size of the bales, is essential both for economy in tonnage and for the safe transport of raw silk.

The form of packing adopted for raw silk is different from that adopted for waste silk, the difference being due to the fact that waste can be treated more roughly than raw silk.

Let us first take the packing of raw silk. The following points are of great importance :—

1. *Uniformity of silk throughout the bale.* In some cases it has been found that good silk has been placed at the top

and the sides of the bale, while silk of an inferior quality is put in the centre. This is not fair to the importer who buys a certain number of bales on the understanding that the entire bale contains the same quality of silk. Care should therefore be taken in packing bales for export and uniform quality should be packed in each bale so as to give the buyer entire satisfaction.

2. *Making up of "books."* Raw silk is exported from China and Japan in the form of "books" each of which contains a definite and equal quantity of silk. In the case of tsatlees, 12 "books" make up a bale of about 100 or 104 lb. "Books" of Japan silk vary from 4 lb. 4 oz. to 4 lb. 12 oz. and each bale contains from 140 to 150 lb. Bales of Bengal raws contain the same quantity of silk. Considering that the best weight per skein is 3 ounces, "books" should be formed in such a way as to contain a very convenient quantity of silk. For this reason, twenty-four skeins per "book" will give us a very satisfactory weight. The standard "book" should therefore contain twenty-four skeins of raw silk each weighing 3 ounces and making up a total weight of 4 lb. 8 oz.

3. *Weight per bale.* This should be properly determined to suit the future shipping conditions and to ensure safety in transit. Bales containing large quantities of silk such as those from European countries (each bale containing 100 kilos or about 220 lb.) would be exposed to damage if exported in a similar way from Japan, China or India owing to the long voyage. The small weight bales are carried very satisfactorily across the seas and the silk usually reaches this country in an excellent condition.

Calculating on the previous basis, the best weight per bale would be 135 lb. excluding the weight of canvas, matting or any other covering used for packing. Each standard "book" contains 4 lb. 8 oz. of silk and therefore a bale of 135 lb. would contain thirty "books." In my opinion the standard bale of 135 lb. would be very convenient and suitable for safe transit.

4. *Material for packing.* Bales should be packed in such a way as to keep them free from damp as far as possible.

Silk should first be packed in clean cotton cloth and then roped round firmly so as to prevent the " books " from moving inside the bale. This should then be covered with paper and carefully packed in matting and canvas bags.

With regard to waste silk, a different form may be adopted. At present, Italian waste is packed in 500 lb. bales and Japan waste in 400 lb. bales. The bales are generally press-packed by means of hydraulic pressure, and have to be treated with power hammers for opening them. In addition to the difficulty experienced in opening, bales containing 500 lb. of waste are heavy and bulky and cannot be satisfactorily transported from Eastern countries.

A very good form of waste silk packing will be 2 ft. × 2 ft. × 3 ft. 6 in. for a bale of 200 lb. The bales should be lightly press-packed to hold 200 lb. weight of waste silk. The bales of the size given above will occupy less space and will reach this country in a very satisfactory condition.

Above I have given the convenient forms of packing which, so far as my inquiries show would be suitable both to the exporter and the importer. In the case of waste silk, smaller and lightly press-packed bales would save the spinner extra labour and annoyance, as hard press-packing is sometimes very difficult to open. Improvements could be made on the forms suggested above to suit the varying conditions, but so far as the method is concerned, it must be a standard so that due allowance may always be made for shipping space. If different bales are packed in different ways and different sizes, there will be no graduated shipping space and the result will be a confusion. It is, therefore, necessary that a system should be adopted to ensure safe transit and to regulate shipping space.

With regard to shipping itself, it is needless to give full particulars here as there are no special difficulties in this transaction. The most important thing, however, is the system of inspection, which must be efficient. It is the custom of the Eastern trade that the buyer has no right to refuse a parcel of raw silk or waste silk, even though it may not come up to standard, and that any dispute must be settled by arbitration. This understanding presupposes the

necessity of importing silk only from thoroughly reliable firms who have in their employ some one who is fully conversant with the article to ensure that only good quality silk is shipped.

When the bales arrive at the docks in England, samples of raws or wastes are taken from various portions of the shipment by the dock company and sent to the importer. If these samples are satisfactory all is well, but if there is any serious difference between these samples and the standards, the shippers are cabled to expect a claim which is ultimately decided by arbitration. Allowance is always made for damage caused by sea water.

It will be interesting to give a brief description of the financial aspect of the export trade in raw silk or waste silk.

All quotations are c.i.f. (namely carriage, insurance and freight paid) either London or Manchester, and at present include war risk insurance.

The exporter pays all charges to the docks and the importer pays the clearing charges on this side.

In the case of payment for the commodity, what generally happens is this: The exporter arranges with his bank to draw through their London agents upon the importer at four months' sight draft. For a shipment of 100 bales, for instance, four drafts, one for each twenty-five bales, would be drawn. These drafts would be made out for the value of the original weight, adjustments being made between seller and buyer when the dock company's weight notes are received in India by the exporter, credit being given by the seller for any short weight, and by the buyer for any excess weight found by the dock company.

When the exporter arranges with his bank for these drafts the bank generally advances him 75 per cent. or 80 per cent. of the value of the shipment, so that he can utilize this money for payment to his supplier. The bank probably might advance him the full amount less the discount and commission, and probably the exporter might reserve a certain percentage of this amount when paying the supplier so as to guard himself against claims for inferior quality. But the latter course would be adopted only in case when

the exporter buys the raw commodity from various merchants and middlemen. If the exporter is himself connected with the organization for collection, he need not take these precautions.

The transaction between the exporter and the importer terminates at the expiry of four months from sight of draft. The commodity must then be paid for whether taken from the docks or not.

It may be observed while passing that strictly speaking, raw silks and wastes are bought and sold on what are known as "company's terms" (an abbreviation of "The East India Company's terms"). Briefly, these terms are understood to be three months' prompt from date of purchase in the case of silk on the "spot," and three months' prompt from date of arrival in the case of silk bought[1] to "arrive."

The importer has to pay the bank against documents and can release twenty-five bales or the entire shipment at his convenience, but he must meet the drafts at maturity if he does not require the silk earlier. The period of maturity of the drafts is now four months instead of three as formerly. This is due to the present shipping difficulties.

As regards buying arrangements, offers are made by cable from the seller to be in force for four days on standards agreed upon beforehand. The four days' time limit holds good in all cases unless some special date is mentioned. If the importer cables acceptance within the time limit the exporter is bound to accept the order, but if there is no reply from the importer within the time limit it is understood that there is nothing to be done.

This four days' time limit, of course, applies to normal times and not to these of the war; longer options are given now on account of the cable delays.

Each side has to pay its own cable and postage expenses. The importer pays for "landed weights" of silk. The dock company furnishes him with an official weight note of the gross weight of each bale and the average tare as found by them; one or two bales being tared to arrive at this average.

[1] Cp. Rayner, *Silk Throwing*, etc., page 21.

The system, on the whole, is not very complicated. It would become simpler if there were an established organization for export in India. The main object of such an organization should be to reduce the number of channels through which the silk passes under the present conditions.

To do full justice to the subject of commercial organization, our next step is to consider distribution of Indian raw silk and waste silk in Great Britain. This is an important part of the subject, as without proper distribution we cannot expect to realize our aims.

(*d*) Distribution

The keynote of an efficient mechanism of distribution should be economy. In some cases this principle is ignored and the selfish interests of dealers take the place of real economy, with the result that the system becomes either a monopoly or speculation. This is harmful both to the producer and the consumer, and hinders the progress of the industry. Moreover, there is no equitable division of profits in pure speculation, and the commodity under consideration does not get an opportunity of showing its commercial value. If on the other hand, the sale of that commodity is solely in the hands of one firm, each and every manufacturer does not get the chance of giving it an experimental trial, so that those engaged in the manufacturing industry follow the " rule of thumb " and do not care to try a new substitute.

Generally speaking, there are two chief points which must be kept in view when considering the problem of distribution of raw silk. The first is economy (which has been referred to in the previous paragraph), and the second is satisfaction. The former is a very important point and plays a great part in almost every industry. It involves the system of more or less direct distribution and helps to organize the system of " selling." A review of the present situation would show that in the silk trade there are a large number of " dealers " known as the " middlemen." Before the commodity reaches the manufacturer, it passes through the hands of about half a dozen persons, each of whom puts on an extra

percentage to the price, and the result is that the commodity becomes " too dear " for the manufacturer. Such a system not only raises the price of raw silk, but brings about a confusion in the market, and is therefore by no means economical. If, of course, we reduce the number of these " middlemen " we introduce economy into the system.

The second point is satisfaction, by which is meant material benefit to the user. When a manufacturer buys raw silk from his agent, he expects full satisfaction from the transaction, that is, his supplies come up to the standard agreed upon before hand, and so far as his requirements are concerned, the quality of silk supplied is maintained throughout. Satisfaction increases the trust of the manufacturer in his agent, and makes the business easier and simpler. It is obvious, therefore, that in the distribution of raw silk satisfaction should play an important part.

Now the problem is reduced to this: If Indian raw silk and waste are to be exported to Great Britain or France, what is the best system of distribution which may involve both economy and satisfaction? The answer to this question is not very simple, and hence it is advisable to examine one or two systems and then decide which one is the best.

Let us first take the system of an absolutely direct sale, that is without the help of a broker. Under this system the manufacturer will have to create a buying department and keep a regular staff for this purpose or else he will have to depend on chance for receiving good supplies. If it is a very big firm of manufacturers who consume enormous quantities of raw silk and waste, they can easily afford to have a buying department, but if the firm is small, the keeping of such a department is out of the question, as they would consider it advisable to pay the broker a commission and then remain free from all responsibility. The broker takes the responsibility of quality and kind upon himself and the manufacturer handles supplies that have been already tested. As the majority of manufacturers are small, the system of direct buying does not seem to be very logical.

Another system is that of selling the stocks of Indian raw silk, cocoons and waste to importers in London, Manchester,

Lyons or Marseilles. These importers act as brokers between the exporter and the manufacturer in the consuming country. This is the most current system at present. Supplies of raw silk from China and Japan are received in London by the importers (who are brokers as well in some cases) and distributed all over the country. As a matter of fact, the system is quite an established one, and the business is in the hands of two or three powerful companies. Even though the system is strong and powerful the problem of middlemen's profits is not fully solved yet and the subject requires a careful consideration. In addition to these big importing houses, there are a number of dealers who take the opportunity of market conditions and make the best of it for themselves.

During my inquiries in France I came across a case of "dealer's profits." In this case Kashmir cocoons were sold by the State to an Italian firm at a comparatively low price. This firm held the stocks for some time and taking the opportunity of rising prices sold them at very high prices thereby making large profits.[1] The Kashmir State or the producer gained nothing in this case, and the reelers on the other side had to pay high prices on account of a shortage of cocoon stocks. Similar cases are frequently observed in the sale of raw silk. In England and Scotland the manufacturers have always been averse to "dealing" in the silk trade, as ultimately this kind of speculation raises the prices of raw silks and reacts on the condition of the manufacturing industry.

It appears from the case cited above that there is an obvious drawback in wholly depending on brokers or middlemen. If there were a very large export trade in silk from India, as from China and Japan, this drawback would not matter much, as the buyers would have to depend on Indian silk and would be compelled to buy it at any price so as to keep their looms working. But as it is at present, the quantities exported are very small, and if the price of a certain

[1] The converse also holds good, i.e. when prices fall the dealer who holds stock loses. We shall discuss this problem more fully in the *Economics of the Silk Industry*.

kind of raw silk rises owing to speculation, the buyer leaves it out and takes up another kind of silk, so that Indian silk remains unsold even though it may be as good as any other. If the dealer happens to succeed in his sales, the producer in India does not gain by it, or in other words, a rise in prices does not in any way benefit the latter and the industry as a whole is unaffected by the market conditions. Under an organized system of distribution market fluctuations are bound to reflect favourably on the producer's pocket. With every increase in the profits of production the producer has the right to receive an increase in his share, and if that does not happen he is not working under progressive conditions. It is therefore essential to regulate distribution in such a way as to obtain an equitable division of profits derived from a favourable market. This can be done properly by what is known as "selling on commission."

The system of "selling on commission" involves the greatest sense of responsibility and is best suited to the marketing of Indian silks. If the export trade in Indian raws and wastes were large, an agency could be started in the importing country, but as the quantities are not large enough to justify the maintenance of a big selling department, "selling on commission" is the best system that can be suggested. In this case, the broker or the commission agent takes an active interest in the business and "pushes the goods ahead." It has been found that more than 80 per cent. of the British manufacturers have never been offered Kashmir or any other Indian silk, the result being that Indian silk never found that favour in the market which it would have done, in some cases, if it had been offered to the manufacturers. A good deal depends on the activity of the agents, who should take a lively interest in the sale of these silks. Without an advertising medium, the users of raw silk cannot choose or reject any new kind of silk. In the open market, one has to push his way in order to succeed. If Indian silks were "pushed" in the market, there would be a greater possibility of an extension of sales than if they were left to the strength of their merit. When the income of the broker or the commission agent depends on the sale of Indian

silks he would naturally take a real interest in them and would try his best to "push the goods ahead."

Another great advantage in this system is that there is no possibility of speculation or stock-holding. If prices suddenly rise and the market becomes favourable for sellers, the extra money thus obtained goes to the exporter or to the State if the industry is under State control. The commission agent also receives a bigger return for his sales, so that both the parties are satisfied so far as the transaction is concerned. In the case of a fall in prices, the exporter or the producer suffers as much as the commission agent and there is no cause of grievance for either of the parties. A rise or a fall in price does not result in enormous profits for the dealer if he is "selling on commission." Judging this system from a commercial point of view one can say that it is the most just and the best. There is no doubt that if the agents took an active interest in the sale of Indian silks, the problem of distribution would be satisfactorily solved and the efficiency of the system would be proved by an increase in the sale of these silks.

Having decided that the system of "selling on commission" is best suited to the sale of Indian silks, and having found that this system stops unjust profiteering by the brokers, our next step is to inquire into the nature of actual distribution and to formulate definite lines on which it could be carried out with success. I have pointed out already that a large number of manufacturers do not even know what kinds of silks India can produce or does produce. This is evidently the result of an absence of that advertisement which is essential to push our silks in the market. It is therefore important that Indian silks should be well advertised in this country and in France.

The first thing is to co-operate with enterprising and pushing agents. Agents in London and Lyons should be supplied with samples of all kinds of raw silks and wastes produced or made in India, and they should be instructed to circulate these samples among the manufacturers and spinners. Specifications relating to quality, size, colour, etc., should be submitted to the parties concerned along with the samples,

so that they can decide whether the silks under consideration are suitable for their purposes. This would furnish them with all the particulars and they would be able to make their decision as to the utility and advisabiilty of using those silks. If they accept the offer and order supplies, the agent should at once send the required number of bales and settle other details. Of course the understanding is always the same, that is, supplies must come up to the samples submitted. In this way large sales could be effected.

For purposes of illustration, let us take the Macclesfield area. In this area there is a manufacturers' association whose important function it is to look after the interests of the silk trade. If the secretary of this association is supplied with samples of Indian silks, he can submit them to the principal manufacturers for trial, so that a complete series of tests can be made with these samples. The throwing machinery and looms can determine the properties of any class of raw silk better than the ordinary tests. After the manufacturers have used and tried these silks they could give a full report on their working qualities through the association and any defects that may be found out could be pointed out to the agent who would at once communicate with the suppliers. Thus there will be a mutual co-operation between the user and the producer and the result will be better production. In the case of waste silk, samples of all kinds of wastes could be submitted to the spinners' section of the British Silk Association and experiments could be carried out so as to find the commercial values of these wastes.

The above considerations lead us to the conclusion that in order to extend the market for Indian silks or wastes, it is important that wider publicity should be given to them. Agents should see that all classes of Indian silks are given a fair trial by the manufacturers and that every practical opportunity of pushing them is taken up. They should also know the exact requirements of various trades and should be acquainted with the market conditions. Supplies should be regulated, and as soon as offers are accepted delivery should be made so as to avoid delay.

I have briefly stated the chief points relating to distribution which forms an important part of commercial organization and have indicated lines on which the latter could be improved. In the long run the success or failure of export trade in any commodity depends on the strength of commercial organization. The better the organization the greater is the extent to which the export trade in silk can be made a success. There is another factor, however, which plays a very important part in the working efficiency of organization and sets the whole machinery of export trade in motion. This factor is the control of the silk trade in India.

(*e*) Control of Silk Trade in India

Before concluding the present volume I consider it proper to give a few suggestions as to the method of control that may be adopted in India to carry out the scheme of exporting raw silk and waste silk to Great Britain and France. It is important that a definite policy should be adopted in this direction, as it is impossible to export supplies of raw silk to those countries without first regulating the resources available in India. This can be done only by an efficient organization which is properly controlled and directed. The difficulty of collection of large supplies of raw silk and waste from different parts of India is not one which should be ignored. It demands our immediate attention, and if we are anxious to extend our export trade we must regulate the supplies at home so as to keep a constant connexion with the importing markets.

Two practical methods may be mentioned here. The first is the system of State control, under which the industry is entirely controlled by the Government and the export trade is conducted by the officials of the State. This system is at present practised in Kashmir where the State controls the production of raw silk as well as its export trade. The system appears to be quite satisfactory and the State undoubtedly receives a large revenue from this useful industry, but there are certain hidden weaknesses which show themselves after a number of years. The producer is never wholly satisfied and in some cases he works under compul-

sion. Even in a perfect organization the State cannot do justice to individual merits, and the result is that some of the workers do not devote themselves to their work in the same spirit as they would if they were working independently. Moreover, there is another serious objection to the system of State control. This is the ultimate effect of this system on private enterprise. An industry flourishes most when each and every member engaged in it has a certain responsibility and pays full attention to its development. This is not possible under strict State control. The spirit of private enterprise should be cultivated and developed in India so as to widen her resources of raw silk. If the production of silk and its export are under State control there is no possibility of giving an impetus to private enterprise.

The second system that may be safely advocated is that of private enterprise aided by State capital. Leading capitalists interested in the industrial development of the country should be brought together to realize the importance of the project, and a company should be formed to take charge of the export trade in raw silk and waste silk. As in every other new enterprise, there is always an initial shyness and fear, but as the prospects begin to appear brighter and encouraging the resolution becomes firmer and more determined. If this enterprise is backed up by State capital, there is no reason why the scheme should not turn out successfully. A large amount of capital is required to carry out the project and it is therefore necessary that the State should take an active part in its working. It must be remembered that a revival of the Indian silk industry means that there is a tremendous task before the country, and so long as the industry is in a stage of infancy State help of some kind is essential. It is not merely a matter of local development, but a matter that involves world competition. The production of silk in France, Japan and other countries is backed by State bounties and the interests of the industry are guarded by the State. In so far as India is concerned, financial help by the Government would go a long way, and the industry would develop more quickly than if it were left to mere private enterprise.

With regard to the exportation of raw silk and waste silk, it is advisable that a corporate body be formed in India to control the collection, grading and shipping of these commodities. This body may be called the Indian Silk Association. The great advantage of this corporate body would be that it would be in touch with the British Silk Association, the Silk Association of America and other similar bodies in other countries. It would represent India's silk interests and would be a medium of general information about the silk trade of the world. This form of control, in my opinion, is beneficial not only to India, but to England as well, because it involves identity of interest and shows a spirit of mutual help.

Considering the present situation of the world's silk trade, I think that immediate steps should be taken to develop India's silk resources. Private enterprise coupled with financial help from the Government would make the industry stable and open new channels for Indian silks. The present opportunity is promising, and if steps are taken to organize the industry and the trade before it is too late, there is every possibility that India will play a great part in the fulfilment of world's silk contracts after the war.

Appendix

HISTORICAL SKETCH

PERHAPS it may be considered superfluous to give an outline of the history of the Indian silk trade before entering into a discussion of a more practical nature. But a moment's reflection will show the necessity of forming a basis for further inquiry by reviewing the essential features of a trade which lived for centuries, receiving its nourishment from the productive soil of India. History in general offers wonderful facilities for research and unfolds the mysteries of the past, but a history of the silk trade does more than that by indicating the lines of future policy with regard to schemes of development and regeneration of a dying industry. The silk industry is slightly different from many other industries in so far as it involves both the past and the present, that is, if the industry flourished in the past and if the present economic conditions are suitable, the possibilities of a future extension are within the sphere of a promising industrial activity. It is necessary, therefore, to criticize and comment on what has been done in the past and to examine the causes which led to the rise and fall of the Indian silk trade.

A critical analysis of the historical data at our disposal shows that the silk industry has played a very important part in Indian economic life throughout all ages. The two fundamental aspects, the economic and the social, exhibit characteristics that are distinct and outstanding. The first explains how the silk industry added to the national dividend of India by producing wealth from sources that might have remained untouched if the employment of labour in that direction had not been initiated. A large percentage of the population of the country found means of livelihood in that industry and thus contributed their share to the general economic welfare which could at any time be measured by its monetary returns. The amount of capital invested in the silk industry varied with the times, but it is interesting to note that its relation to the capital invested in other industries was always somewhat peculiar as the sources of raw material were more or less supplied by nature without a very high remuneration. Thus the industry formed an important part of the huge economic structure of India, maintaining the strength of the other members and keeping the balance of the sister industries.

The second aspect deals with the part played by the silk indus-

try in the particular development of social and intellectual life in India. History records the changes that have taken place during different ages in the tastes of the people so far as dress is concerned. Silk wrought miracles in transforming the external appearance of the royal courts and princely mansions. It contributed to the stock of Indian art and in its manifestation it gave novel ideas to the genuine artist who discovered gorgeous designs for his artistic creations in the ever-adaptive quality of silk. Sir George Birdwood, in his admirable work *Indian Arts*, has well expressed his views on this subject. "Its marvellously woven tissues and sumptuously inwrought apparel have been the immemorial glories of India. India was probably the first of all countries that perfected weaving, and the art of its gold brocades and filmy muslins, 'comely as the curtains of Solomon,' is even older than the Code of Manu." [1] The ornamental designs in the silk brocades were once the highest expression of original art that achieved a world-wide reputation, and afterwards passed from India to Damascus, Tabriz, Constantinople and Tripoli. The art of weaving in silk reached the highest stage of perfection in ancient India. The exquisite beauty and fineness of muslins, is illustrated by the following sentence from Sir George Birdwood: "In the ancient sculptures the women are represented both in richly embroidered brocaded robes, and in muslin so fine as to fully expose their form, the lines of its folds, or of its silk and gold edging, traced across their bodies, being the only evidence that they are clothed" [2] Silk was thus a prime-mover in the world of art as in society where by a gradual process of evolution in the life history of dress, it moulded or we may say remoulded the covering factor of civilization. These historical considerations are very interesting and illuminating, but the main object of our present study is to trace the development of the Indian silk trade from a comparatively early period to the beginning of the present century, and to examine the chief causes of its decline.

From ancient works on history it appears that the Eastern silks were not generally known in Southern Europe before the time of Julius Cæsar (B.C. 47), "who first displayed a profusion of them in some of those magnificent theatrical spectacles with which he was wont to entertain the populace of Rome." These silks were supposed to be mainly Chinese, and the trade at this time was carried on between the extreme Orient and the West by land. India had a share in this international trade both as an active exporting country and as an agent for transferring the goods received from peoples inhabiting Chinese Tartary, who were very keen traders and sent commercial embassies every year to China.[3]

[1] Birdwood, *Indian Arts*, Vol. II. p. 68. [2] Ibid. p. 69.
[3] *J.R.A.S.*, p. 984. *The Coinage of Kanishka*, by J. Kennedy.

The silk trade before this period was mainly a caravan trade by land, and followed one of the two routes: it went either by Khotan across the Himalayas to Kashmir, Gandhara, and Kabul; or the goods were carried to Kashgar and Yarkand, and thence to Sogdiana and Bactria. The former route was the principal channel of the silk trade in the first century B.C. There are two interesting points about this commercial route; first, that Kashmir took an active part in this trade and sometimes added to the commodities from her own stocks for export purposes; secondly, that ultimately the silk passing through these countries found its way to Syria, where it was reworked for the Roman market. The silk from Kashmir and Kabul sometimes found its way to the head of the Persian Gulf, and was then either carried overland across the desert by way of Palmyra to Syria or transported by water to Leuké Kómé at the head of the Red Sea. Palmyra attained an eminent degree of splendour owing to the vast increase of wealth consequent upon this commercial speculation. The chief traders between India and the Persian Gulf were the Messenians.

In the beginning of the Christian era and the centuries following, the silk trade changed its channel. The sea route became popular and instead of following the land route, the traders took advantage of the Indian Ocean for conveying their commodities to the West. Alexandria became the central distributing mart of Southern Europe, and international trade between India and Rome became the source of maritime prosperity for some time. The balance of trade was in India's favour as is shown by Pliny. "At the very lowest computation India, the Seres, and the Arabian Peninsula drain from our empire yearly one hundred million of sesterces, so dearly do we pay for our luxury and our women."[1] Indian commodities formed the major part of this trade, and according to the Periplus of the Erythræan Sea, "silk whether in the raw state or spun into thread or woven into cloth"[2] was brought from a great city in the interior of the country called Thina by land and exported from Barygaza and Barbarikon at the mouth of the Indus. But the quantity of silk exported from these ports through the Red Sea, Berenice, and Alexandria was comparatively small as silk from China still followed the former route, that is, via the Persian Gulf to Syria and thence to Rome. The importance of this communication with India is illustrated by the efforts that the Roman Emperors made during the first century A.D. to maintain amiable relations with the Persians.

The Persians after this period started extending their terri-

[1] Pliny, xii. 84 (c. 18): McCrindle, *Ancient India*, p. 125.
[2] *Periplus Mari Erythræi*, by McCrindle, p. 147.

tories, and in the beginning of the third century A.D. the neighbouring nations, jealous of their commercial prosperity, set up a campaign against them. But the Persians soon achieved victories and became the masters of the littoral of the Persian Gulf. These wars resulted in temporarily cutting off all direct communication between India, China and the Western World.[1] Owing to this reason, in the time of Emperor Aurelian, silk was extremely dear and scarce in Rome, as large supplies from China, Khotan and Kashmir by Kashgar, and Samarkand through Kabul were either wholly stopped by the Persians or a part distributed in the interior of India or sent to the ports of the Indus for export purposes by the other route.

The chief consequence of this change was that the Persians now held the monopoly of raw silk and silken stuffs. Their commerce attained a considerable prominence both by land and by sea, and the Romans were barred from any share in this international trade. They had to depend mainly on the generosity of the Persian merchants who charged exorbitant prices for all kinds of silk.[2] The crisis became still more painful owing to the popular use of silk among men and women in all classes of Roman society during the fourth and fifth centuries A.D. The Persian manufactures were highly prized by the nobility and the result was a constant drain on the gold of the country. In the beginning of the sixth century A.D. Justinian wanted to revive the ancient commercial route by the Red Sea to India and in order to improve the state of affairs, imposed heavy duties on silk. But the situation changed for the better in the middle of this century, when two monks visited Northern India and after learning the art of raising silk introduced it into Constantinople.[3] The main difficulty, however, was that absence of any form of corporation prevented the industry from making steady progress and the comparatively small production was not sufficient to meet the ever-increasing internal demand of the Byzantine Empire. Thus the Western Countries had still to depend upon the East for their supplies of raw silk.

India's part as an intermediate mart between China and Central Asia on the one hand, and Persia and Rome on the other, was very important before the seventh century; but now some other factors came to react upon the commercial situation. The strained relations between the Persians and Greeks subsided more or less and the opening of the Caspian Sea route from North of China altered the general conditions of transport. From the beginning of the eighth century the silk trade found a different

[1] Mannert (*Geogr.* IV. 6, 7, p. 517).
[2] *Amm. Marcell*, lib. XXIII, Pariset, p. 167.
[3] Procopius, *De Bello Gothico*, IV. 17.

route. The country watered by the Indus and called by the Arabs, Sindh, was no longer the transmitting country of Chinese silken stuffs. The former route from Central Asia through Kashmir and Kabul ceased to be the caravan route after the ninth century.

Old records fail to add anything to the history of the silk trade from this period to the thirteenth century. But this absence of historical information does not imply that silk from Khotan and Kashmir had no external outlet. It is interesting to note that after the conquest of Northern India by the Mohammedans, commercial relations between these two countries developed to a great extent, and it is possible that silk formed one of the commodities of export even at that time (but it is certain that the Western Countries obtained their supplies direct from China by the Caspian Sea). It is impossible to determine the exact nature of the silk producing industry in India between the ninth and the thirteenth centuries, but it is obvious from occasional historical references that Kashmir continued to contribute to the stock of silk throughout these years, as the accounts given by the Persian and other tourists show that the famous shawls were world-known at that time and were made of silk entirely in some cases. These references, however, do not give an exact idea of either the development of the industry or the trade in silk.

After a conquest of the greater part of the Peninsula of India in the thirteenth century and having engrossed the commerce of the country, the Mohammedan Moors transmitted during that and the two following centuries the rich merchandise of India for the European markets, chiefly from Aden in Arabia, by the Red Sea to Suez, from whence it was conveyed upon camels to the Nile, and there shipped for Grand Cairo and Alexandria. The merchandise included silk; and sometimes it was carried from the Persian Gulf to the Euphrates and afterwards conveyed by caravans to Aleppo. From these places it was dispersed by the Venetian and other European merchants over the Western World. England was supplied with Indian commodities by an annual ship from Venice, "of great burthen and immense value, which they sold at their own prices."[1] In this condition the commerce remained for a considerable time without any attempt of the English to participate in so beneficial a trade. It is difficult to ascertain how much of this trade included silk, or even to give an approximate idea of the bulk of trade in silk.

In the beginning of the sixteenth century (1503), Ludovico[2] di Varthema, a traveller who visited various countries in the East, makes a mention of the commodities that were imported

[1] Milburn, *Oriental Commerce*, Intro. i.

[2] *Travels of Ludovico di Varthema*, Hakluyt Society, Vol. 32 pp. 38, 107.

into Mecca. Here mention is made of "a very large quantity of stuffs of cotton and of silk from a city called Bangchella in India Major." In another part while describing the city of Combeia, known at present as Cambay, he talks of "a large quantity of silk stuffs that were exported from this city to all parts of India and other countries." It shows that in the first place the Mohammedan Moors and the Arabs were the chief Oriental merchants and navigators; in the second place silk was exported to Mecca and other places from India. It may be concluded on similar lines that the silk produced was that of Bengal, and this was the only kind well known to the foreign market as no other variety is mentioned in these accounts. But as before, it is impossible to say how far the export trade in silk progressed and this uncertainty is due to the absence of statistical data. The extent to which the foreign user of Indian silk confined himself cannot be determined from these accounts.

Upon the discovery of the passage to India by the Portuguese in 1497, the mart was diverted from Venice to Lisbon. During the whole of the fifteenth century Calicut was the principal exporting centre. It was a perfectly secure harbour and brought together merchants from every city and from every country. The Portuguese seem to have established themselves there in the beginning of their trade relations with India.

This period is a landmark in the history of the silk trade from India. After the participation of the Portuguese in the Indian commerce there is no doubt that the goods shipped to Europe included large quantities of silk. The Portuguese were for some time the principal distributors of Indian silk. Large quantities were shipped from various ports and sent to Lisbon for distribution throughout Europe. The trade remained in their hands right till the end of the sixteenth century when other European nations joined in the struggle. The benefits of this trade were too obvious to be overlooked by the rival powers and soon the market was being taken up by other competitors. In 1592, some private English ships of war captured a large "Portuguese carrack," called *Madre de Dios*, of 1,600 tons and brought her into Dartmouth; she was the largest ship ever seen in England. The cargo consisted of a large quantity of silks and other valuable commodities. The possession of such immense foreign riches greatly encouraged the English to go directly to the East Indies on a mercantile account.[1]

The beginning of the seventeenth century saw the commencement of the English commercial enterprise in India. Surat was the first centre from which commodities from all parts of India and the Far East were exported to England. Bengal was the

[1] Milburn, Intro. IV.

storehouse of Indian silk, and a fairly large silk industry existed, both in rearing the worms, reeling and throwing the silk and in weaving all manner of silken goods. But the English merchants did not extend their commercial relations as far as the Eastern Bengal and for the first two years confined themselves to Surat trade. The first Letter Book of the East India Company gives us some interesting details, and shows that there was a favourable demand for Indian silks in England at that time, and the merchants of the London Board insisted upon their agents in India buying such useful commodities as silk, and not going in too much for spices, etc., with which the market was already glutted. Moreover large quantities of Persian silk were exported from Persia in exchange for English commodities at reasonable rates. China silk was also very popular in England and was first imported into India by the Indian merchants and then re-exported to England by the servants of the Company.

Information regarding the supplies of Bengal silk reached the factors of the Company as early as 1616, when Sir Thomas Roe, the first English Ambassador to the Court of the Great Mughal wrote to the Directors about "the silk of Bengala" requiring a factory. In the same letter he states that this kind of silk was very cheap at Agra, which shows that the Bengal silk was used all over India and the internal demand of the country was supplied from the quantities of raw silk available within its own boundaries. In 1620,[1] Hughes, one of the factors of the East India Company made acquaintance with Bengal silk. He went to Patna for cotton, and found this variety of silk in any quantity he might desire, together with an unlimited supply of labour for converting it to English uses. He also found, and at first he thought that it would be very useful to the Agra factors, that there was a difference of 36 per cent. in the price of skein silk between the two places in favour of Patna, but the price at Agra fell for various reasons from 25 per cent. to 30 per cent. within a year. The best silk came apparently in cocoons from Murishadabad in Bengal. The sale of the skein silk was a monopoly of the Governor and all transactions were carried through his agents. Hughes considered it best to wind off the silk from the cocoons himself and to send skeins of his own winding direct to Agra. He intended to start a factory of 200 to 300 silkwinders, but on receipt of discouraging letters from his principals he did not employ more than a hundred. He produced what he called seven qualities of silk threads from a ser [2] of cocoon silk. Ex-

[1] *The Travels of Peter Mundy*, Vol. I. *Asia*, pp. 370–71.

[2] Ser, the weight of 34½ "pices": a pice being a copper coin valued at 64 to the rupee and conventionally weighing *then* say half an ounce, which would make the weight of the ser 17½ oz. or a little over a pound—quite different from the present ser, which is equivalent to 2 lb. approx.

pressing these in ordinary form the Bengal silk per ser weight was wound off the cocoons in the following proportions :—

1. Shikasta ; broken, irregular .	.	18½	per cent.
2. Katwai ; imperfect, discoloured	.	11¼	,, ,,
3. Gird, round, even quality .	.	7¼	,, ,,
4. 2nd, 3rd, 4th, 5th sorts, good quality		37¼	,, ,,
5. Waste ; valueless . . .	.	26	,, ,,

Roughly speaking 50 per cent. was waste. The customary length of the skein was a coved of 33½ to 40 inches, but for the purposes of the English market Hughes made it a yard. Hughes tried to make other improvements in the system of trade dealings, but his scheme did not mature well before he was recalled to Agra, and the work was left for Streynsham Master to accomplish half a century later. It is interesting to note that at this period and later still the Portuguese competition was very keen. On account of the rising demand for silk by two rival nations prices were favourable to the producer, and trade was carried on a good system (though unapproved by the European traders). In one of his letters, Hughes writes to the President and Council at Surat, "There are latlye come up divers frigitts of Portingalls from Sutgonge, whose merchants buye up all theye can laye hand of."[1] Apart from the large quantities of silk that were carried to the capital of the Mughal Emperor, the Portuguese favoured the market to a certain extent and made the commodity popular. Another important fact that must be mentioned here is that, as early as 1620, the English traders were interested in tasar. The same letter shows that Hughes "bought for 400 rupees in tusser stufes of Bengala." Thus there was the beginning of a trade in ordinary raw silk and also tasar silk.

After Hughes' return to Agra, no fresh impetus was given to the Company's silk trade for a number of years. This want of attention on the part of the Company was due to the fact that the Portuguese were much favoured by the people of India and they held the stocks in check and bought the silk at rather favourable terms from the Indian merchants. But the trade of the Portuguese prospered only till the middle of the century after which the East India Company started taking particular interest in Bengal silk. The other reason was that large quantities of silk were exported from Persia at this time. This subject is fully dealt with in the volume of letters received by the East India Company.[2] In a letter from John Jourdain to Richard Wickham dated May 12, 1616, the former says "The chiefest commodity

[1] *English Factories in India*, Vol. 1618–21, p. 197. *Factory Records, Patna*, Vol. i., p. 4.

[2] *Letters Received by the E.I. Co.*, Vol. III. pp. 211–12.

that Persia affordeth is raw silks, and worth at present 13 dollars rials per batman of 1,200 drams." Throughout the whole correspondence of this period we find frequent references to the importance attached to the Persian silk which was exported through Turkey. In another letter from Thomas Rastell to the Masaulipatam Factory, written in February 1623, the writer gives the following account of silk from Persia. "Our fleet from Persia are (blessed be God) returned in saftie with this yeares full cavidall of silke, consistinge of 804 far(dles), great, small wich by the lattnesse of the seasonne and our want of goods to make it up two shippes ladinge (the silke in one bottom being too great an adventure) we are inforced to despeed upon the Wale and Doulphine, nowe bound for Mocho."[1]

Another interesting side of the export trade was the introduction of the muga silk in 1624, as is shown by a letter from President Brockedon to the Factors at Masaulipatam. "The Company has also given order to buy 20 sere of moga,[2] which wee pray you send by the Unity; and advize withall at what prices the same may be bought when the joncks arrive from Bengala and what quantity yearely to be had, and inquire (if you can) whereof the said moga is made, how it groweth, and the manner of curing it, for the like is thought to grow in Virginia, which they call silke grasse."[3]

It appears that in 1646 and afterwards the Dutch gained prominence at Ispahan in Persia and the English silk trade with Persia began to decline about this period. Commenting on the discontinuance of the British trade in Persia, Thomas Merry at Swally Marine writes to the Company, and gives suggestions to revive this part of the Company's commercial enterprise. He says: "This should however be done gradually; and if possible, leave should be obtained to buy silk of private merchants instead of being forced to deal with the King's Ministers for it."

Consequently, the Directors wished their agents in India to pay more attention to Bengal silk and, in 1650 instructions were again sent to make inquiries about the production and manufacture of this silk. In one of the letters written at this time, we find the following: "In silke you know what great matters are to be done, therefore it doth import the Company much, that you strive both by relation and your own experience to know how, and where best to carry on the Manufacture thereof, where the best silkes are procured, and where the best conveniences are for fitting and preparing the Same for the Sale, of Europe, that soe if the Company shall require large quantities you may bee in a posture to fitt them all at the first hand. I suppose the order

[1] Vol. 1622–23, p. 201. [2] Moga is the same as muga.
[3] *Factory Records*, Fava, Vol. III. Part ii. p. 284. 1624–27

of the Dutch is very good, and will be freest from adulteration, the properest way will bee to make three sorts, as Head, Belly, and Ffoote, each apart by themselves. You may also make an experience of washing thereof at Hukely or elsewhere, and send the Company a maund of each Sort apart by the next Shipping for a Sample, with an exact accompte of the losse in washing, and charge of the same. In this commodity you may invest neare three eight parts of your remaines."[1] This extract affords interesting information. In the first place there was the keen desire on the part of the Company to invest large sums of money in silk. Secondly there was the want of organization and knowledge of the production of this commodity, and hence a rather primitive classification of the various kinds of silks. Moreover the directors wanted their agents to try the degumming experiments in India ; a process which was successfully practised there.

The silk trade of the East India Company passed through a series of struggles till the year 1676, when the matter was seriously taken up by Streynsham Master, the chief representative of the Company in the Bay of Bengal. He witnessed a number of abuses which the servants of the Company practised in buying up private supplies of silk and employing weavers to the detriment of the Company's investment, and which were highly reprehensible actions in the eyes of the Court. The servants, in order to benefit themselves, paid no attention to the improvement in the methods of trading. This indulgence in uncommercial practices and cheating had completely deteriorated the export trade of silk.[2] Master therefore proved himself equal to the task and started with improving the system of packing which was very defective. He noticed that the merchants used ropes of the very lowest sort for packing purposes, and at once arranged for the " Company's silke " to be " packt with such Ropes " to be made of the " Refuge silke " which would save " Freight and Custome."[3]

His efforts were then directed to the overlooking and pricing of silk goods and the proper supervision of raw silk. The Dutch trade in silk had considerably declined by this time and this helped Master a good deal in his endeavours to promote the interests of the Company. He set about his reforms in an energetic manner and, after regulating the " prizing thereof," he took strict measures " to prevent theft and alsoe deceit in changing and mixing the severall sorts of silke." Other measures were enforced to regulate the system of buying the raw material for

[1] Original Correspondence. O.C. 2186, India Office. Also *English Factories*, Vol. 1646–50, p. 333.
[2] O.C. No. 3582 and 3599.
[3] Streynsham Master, Vol. I. pp. 112–13.

exporting it to England and to improve the order of commercial transactions.

The Diary of Streynsham Master [1] gives further particulars of how silk was priced and selected. After the arrival of a convenient quantity, it was opened before the chief, second and third or the warehousekeeper of the factory, who, out of two bales of four maunds picked out samples for inspection (5 or 6 skeins from the whole heap) and compared them with the samples on which the agreement was made with the silk merchant. They separately made their judgments and the average of the three prices was taken to be the proper price for the whole lot. The raw silk was then prepared for the warp and the weft according to the requirements of the agents with regard to the number of threads to be used in each. The measure of weight used for England was 70 rupees sicca per ser. Sometimes experimental trials were made with the samples received from the merchants and the quantity of silk that could be got from different qualities of cocoons was determined. This method ensured the quality of the silk and made business more reliable.

Master framed a number of other regulations with a view to increasing the silk trade of the East India Company; and it seems that his endeavours met with success on account of the pains he took to do this at a period when supplies from Persia became unobtainable. England received large quantities of raw silk and silk goods from India, and from this period we can trace a gradual development of trade in silk between the two countries. We may therefore safely give the credit of this development to Master who spared no pains to change the entire system which had formerly fallen into the hands of those who did not go beyond their selfish interests, and besides making the poor producer a victim of their vile methods, caused a serious injury to the investments of the Company. Practically in every case they explained their conduct by stating that they were not adequately paid by their masters; but the fact remains there and we cannot deny that there was always room for corruption so long as trade organization was absent.

The general effects of this prosperity of the silk trade are beyond the scope of our present subject; but it may be pointed out that in some commercial circles this was considered to be a loss to England. Of course it is impossible to judge the exact nature of the loss incurred, but undoubtedly other commercial bodies seeing that the East India Company were developing a system of monopoly by holding the entire silk trade in their own hands, raised objections to the use of Indian raw silk and silk goods in England. In the first place it affected the "Turkey

[1] Streynsham Master, Vol. II. pp. 9–13.

merchants " very much who annually imported large quantities of raw silk from the Levant and thus suffered heavy loss on account of the importation of raw silk from India. But, after all it was a personal loss of a body of merchants as against a national loss which was completely ignored by the few who protested against this trade. In the year 1680 those interested in the Turkey trade raised complaint of a very strong nature and wanted to prove that the East India Company's trade was utterly detrimental to national commerce and therefore steps might be taken to prohibit the importation of raw silk and silk stuffs from India.

It would be very interesting to find out the root of these complaints by watching the gradual development of the English trade and commerce in the East Indies. In the beginning when the Dutch, French and other European nations took part in this valuable and lucrative trade, the capital invested by the English did not bring in any substantial return, the result being that the general public opinion in England went against this trade. But it seems to us that the most useful commodity which revived the commerce and had a favourable influence on the future prospects was raw silk which at this time was the subject of criticism. The following remarks by a writer who studied the subject from an economic point of view are very suggestive :—" England hath already the principal trade of Woollen manufactures, and now a quicker vent and export for them than ever it had in the memory of any man living. But through Christendom I have ever been of Opinion that generally speaking there are more men and women employed in silk manufactures than in Woollen : of which England hath obtained a considerable part, considering the short time since our Silk Broad Weaving began ; which was but since Mr. Burlimach brought in Silk-Diers and Throwsters, towards the end of the late King James, or beginning of King Charles the Fifth's Reign. And I am credibly informed of the number of Families imployed therein in England doth amount to above 40,000. Now, what should hinder but that in a few years more, this Nation may be treble that in such Manufactures ; since the East India Company have of late years found out a way of bringing Raw Silk of all sorts into this Kingdom, cheaper than it can be afforded in Turkey, France, Spain, Italy, or any other place where it is made."[1]

Later, the same author answering the objections against the East India trade says : " The truth of the case at bottom is but this. The Importation of better and cheaper Raw Silk from India may probably touch some Turkey Merchants' profit at present,

[1] Extract from *A Treatise concerning the East India Trade*, by Φιλοπάτρις London, 1681. I.O. Library.

though it doth benefit the Kingdom, and not hinder the exportation of cloth. What then? Must our Trade be interrupted because it works upon another? At that rate there would be nothing but confusion in a Nation ad infinitum." These protests and objections were also raised by the "Turkey Merchants," whose trade was to a certain extent hampered by the East India trade. Formerly Turkey used to be the general supplier of raw silk in Europe and had this special trade more or less a monopoly; but now raw silk from India brought about this competition owing to its cheapness, and hence these vain protests from the merchants in question.

It appears from all the documents published at this time, that after the loss of Bantam and the Dutch Treaty with the King of Persia, it was considered absolutely essential by the East India Company to develop their trade with India in order to keep the balance steady and show increase in the return to investment. The chief investments at this time being in raw silks and wrought silks there may be traced a general development in the silk trade and a gradual increase in the amount of export. In 1696, another essay was published on the East India trade by the author of *The Essay upon Ways and Means*, in which it was shown that silk being of foreign growth and an essential for the home manufactures, it was necessary to import it from India instead of from Holland, Italy, France, Turkey and other places at a dearer rate. It was therefore detrimental to the trade and manufactures of England to prohibit the importation of these silks from India. An examination of the arguments against the importation of raw silks from India displays an economic struggle through which every enterprising nation has to pass in the stage of its infancy. Competition is the best form of stimulant for development of industry, and the nature of that stimulant depends upon the situation of the country in question. The result of this competition is expressed by the following quotation. "The East India Goods since they were in use have apparently lower'd the Price of Silks from France, Spain, and Italy, at least by 25 per cent. and if their Importation should be prohibited, will it not follow naturally that the European Countries will again advance upon us." Another danger that England had to face at this time was that the Dutch were making steady progress in their silk manufactures on account of large imports of raw silk from Persia and the East and then after manufacturing it at low prices with their comparatively cheap labour glutted the English market with their silk goods. The result of this might have been a complete destruction of the English silk industry which employed a large supply of labour in the manufacture of broad silks and other silk stuffs, and in order to avert that danger the promoters of the East India Company gained another point in their favour and

tried to supply the silk manufacturers with raw silk from India at cheaper rates and better advantages than they could derive from any other country. This competition with the Dutch and with other European nations resulted in the increase of the Indian silk trade of the Company, who did their best to enhance their prestige and to increase the production of raw silk in India. The extent to which the imports into England of wrought silks from the "Bay of Bengal" and other places of India was carried on, is well shown by a pamphlet published in 1697 by T. S., a weaver in London, who gave reasons against "the Home Consumption of East India silks and Bengals." According to this author, it seems that a large amount of money was invested in these commodities and a tremendous trade was carried on, which was supposed to be detrimental to the home manufactures of England; the reason being that the English woollen manufactures could not be sold in the hot climate of India; and therefore there was an outflow of gold and coin to India for the purchase of these commodities.

But unfortunately prosperity does not last long, and as soon as the servants of the East India Company realized the increasing demand of raw silk in England, corruption became inevitable, and by the middle of the seventeenth century things again changed for the worse. On the laying open of the trade, the article of raw silk was instantly enhanced to the Company's full 80 per cent. "The Contract made for that Commodity, wound off in the Bengal Method which used to sell for less than Six Rupees, or Thirteen Shillings for Two Pounds Weight arose to Nine Rupees, or near Twenty Shillings, and the filature silk was very soon contracted for at Fourteen."[1] (Appen. 33, General Letter to Bengal, December 24, 1776, Par. 70.)

As price plays a great part in the competition, the popularity which the commodity enjoyed soon declined and there were continual complaints from the manufacturers and users of this class of silk, both regarding the price and the quality of the goods sent. This rise in the price of silk was due to "the dreadful effects of the monopoly on the Cultivators, whose labour was judged by those who were profiting by it: and the measure of their judgment was not a great deal more than, by their own Account, about two thirds of the value of that labour." The intermediate agents always made a considerable profit and left nothing in the hands of the real producer.[2] This corruption was not confined to the Company's share which however covered a

[1] Ninth Parliamentary Report from the Select Committee, 1783. I.O. Record Dept., Vol. 15.

[2] Appendix 34 of the same Report. General letter from Bengal, October, 1774, Par. 31.

great part of the trade; but as this was an article permitted to the servants, the pains of those oppressions became still greater. The price was raised in the raw material and quality debased to a considerable extent, which was not due to a free market but to the dishonesty of the servants who threw upon their masters the refuse of their private trade and charged exorbitant prices for those goods.[1] The evil may be entirely attributed to the practices of those engaged in their service.

In the mortifying dilemma to which the directors found themselves reduced owing to the loss in trade due to this evil practice, they considered it best to revert to the old system, i.e. "the Coercive System of providing an Investment, or to abridge the Freedom of Commerce," by absolutely prohibiting the servants from trading in any of those "Articles which compose our Investment, directly or indirectly except on account of the East India Company until their Investment is completed."[2] The result of this order was that all private trade was now carried on in obscurity, and instead of doing any good to the trade it introduced a system of frauds which were difficult to find out, and so the Company in 1776 set the trade free again, with abuses and evils as before.[3]

To compromise the old jealousy which prevailed between the Company and the manufacturing interest of England, and to furnish a cheap supply of materials to the manufacturer at home, the directors formed a scheme which tended to destroy, or at least essentially to impair the whole manufacturing interest of Bengal. The policy seemed very popular as the Company was now represented as the instrument of improvement rather than a dangerous rival as it had been known to be before. They accordingly notified the Presidency in Bengal in their letter of March 17, 1769, that "there was no Branch of their Trade they more ardently wished to extend, than that of Raw Silk." They objected to the policy of compulsory employment and claim to have recommended every mode of encouragement, and particularly by augmented wages, "in order to induce Manufacturers of Wrought Silk to quit that Branch, and take to the winding of Raw Silk."[4] According to their instructions it seems that the silk winders were to be prevented from working in their private houses, where they might work for private traders, and to confine them to the Company's factories where they could only be employed for the Company's benefit.[5] Where formerly the directors claimed to correct the evils and abuses of the private

[1] App. 32 General Letter from Bengal, March 3, 1775, Par. 17 to 30
[2] App. 32 General Letter to Bengal, March 3, 1775, Par. 27.
[3] App. 33 General Letter to Bengal, December 24, 1776.
[4] App. 37 of the Ninth Parliamentary Report.
[5] General Letter to Bengal, March 17, 1769.

trade, now they were busy introducing more evils themselves so that the previous statements with regard to the reform in view cannot be reconciled with these new orders which meant nothing but oppression and high-handedness on their part.

These restraints and encouragements seem to have had the desired effect in Bengal, with regard to the diversion of labour from manufactures to materials. The trade of raw silk increased rapidly. But the Company soon found in the increase of price and debasement of quality of the wrought goods a loss to themselves which fully counterbalanced the advantage derived from the increased production of the raw commodity.[1] The unnatural and forced trade did not actually result in profits. The apparent effect might have been encouraging to start with, but after a critical examination of the accounts it was found that the Company was suffering an increasing loss for the past four years on several descriptions of silk, instead of alteration for the better for the last year's productions.[2] The losses in this trade went on increasing from 1774 to 1779 and amounted to a sum of £642,725 in four years. It is remarkable that the same article in the China trade produced a considerable and uniform profit. The real cause was not in the system of production or skill, as all the available skill in that line was properly utilized and experts sent from Italy and other places, but the root of all failure was the disinterested attitude of the labour force towards the conduct of the industry. There was no real stimulus for the working man and the producer of silk; he was a mere tool for a certain selfish and monopolistic end, and did not care to play a really active part in the development of that industry. It naturally drew the business from Indian management; and it caused a revulsion from the trade and manufacture of India, which led as naturally and inevitably to an European monoply, in some hands or other, as any of the modes of coercion which were or could be employed.[3] The other reason of labour's disinterestedness was this: The Company purchased raw cocoons at a fixed rate; the first producer, who, whilst he could wind it at his own house, employed his family in this labour, and could procure a reasonable livelihood by buying up the cocoons for the Italian filature, now incurred the enormous and ruinous loss of fifty per cent.[4] After a series of unsuccessful experiments and failures due to the evils described before, the directors of the Company resolved in 1781 to expunge raw silk from their investment. They gave it up to private traders, "on condition of paying the Freight, Charges, and Duties;

[1] Appendix 31.
[2] Appendix 43 G. L. to Bengal, February, 1774.
[3] General Letter to Bengal, July, 1780, Par. 22 and 38. App. 40.
[4] Appendix 45.

permitting them to send it to Europe in the Company's ships, upon their account." [1]

From the above Parliamentary documents and other evidence of the like nature, it appears that, hitherto, investments in silk had been provided by the Company by the system of contracts, a system which had proved to be useless and open to abuses. Now this was changed into the mode of providing the investment by the agency system and payment of commission was substituted, and continued in practice for many years. On account of extensive warlike operations in India the Company's financial embarrassment led to their taking another course of action; the trade in raw silk was now thrown open. The Bengal Government were directed to leave the trade free to all persons, either in the service of the Company in India or enjoying their protection, and to permit them to export from Bengal any quantities of raw silk on their own account. The Company's buildings and filatures were rented and expert assistance given when desired; on condition that the Company could resume possession and exclusive trade upon giving two years' notice. The resolutions of the Court were not carried out until 1783, when the Court's licence was published throughout India, and silk, the property of the private individuals was sent home accordingly.

In 1785 the Court informed the Company that they wanted to resume the exclusive trade by not confining to the Company exclusively the manufacture of raw silk in the Bengal provinces, but merely to resume the exclusive right of bringing it home from India and to revoke the privilege formerly given to the Company's servants and others, of sending the article to Europe on their own private account. But this method does not seem to have proved a success owing to local difficulties, and in 1791 the measure of opening trade to individuals was again resorted to in consequence of the want of commercial funds. In 1792 the silk harvest was peculiarly flourishing and the custom-house returns show a considerable increase in the exports in all parts of India by land as well as by sea, both to Madras and to Bombay.[2]

Apart from the inland trade, there was a visible increase in foreign exports of silk from India; specially when compared with an average of imports into England from Turkey and Italy. As a matter of fact, the result of this temporary prosperity was seen in the quick decline of importations from Aleppo and other places in the Mediterranean; and in a very short time the whole of the silks used in this country were supplied from the northern provinces of Italy, Bengal and China.

[1] Appendix 47 and 48.

[2] Reports and Documents of the East India Company on Cotton, Raw Silk and Indigo.

But soon after this the French Revolution altered the commercial conditions prevailing on the Continent, and as a direct result of this crisis the weavers suffered heavily and unemployment became common. The silk trade thus experienced a more than ordinary depression owing to a huge reduction in the consumption of raw silk. England was naturally affected by this change and a large surplus quantity of silk was available without any outlet. The directors of the East India Company decided to cause this unsold surplus to be thrown into organzine, with a view to its being brought into use as a substitute for part of the thrown silks which were then imported from Italy. Much opposition was raised against this practice when the silk was put up at the Company's sale, but it seems that by February, 1796,[1] the reputation of Bengal organzine silk was fully established and the Company was requested to continue its practice. It being established that Bengal raw silk could be profitably thrown and organzined in this country to the advantage of the manufacturers, orders were sent to extend their consignments of silk from Bengal to 4,000 bales per annum.

A few years later the Bengal silk industry saw some more improvements which were the result of an entire cessation of Italian silks in England. The Court wanted to procure the maximum production from Bengal to meet the requirements in the home market and to keep down prices which had risen considerably on account of short supplies. These improvements continued to be made every year till 1833 when the Bengal Government was informed by the Court that under the provisions of the Bill then in progress through the Parliament, the Company's exclusive trade with India and China would come to an end. Provision of silk was, however, carried on till 1835, but after that period trade in raw silk was thrown open.

Systematic and historical treatment of the export trade of Indian silk seems very difficult after 1835. There is no documentary evidence at our disposal to draw an outline of the trade. The subject remains in obscurity for a number of years, as the interest of the East India Company was no longer concerned and export trade was in the hands of private individuals who apart from a certain monetary return took no active part in recording the information that they had the opportunity of gaining while engaged in the business. Export figures as given in the official tables are our only guide, and from these we can deduce that there were considerable fluctuations in the silk trade till 1874, partly owing to a depression in the European production and partly on account of local conditions. The English market was well supplied by the Indian silk and from what we can gather from the

[1] The Company completely relinquished this practice in 1814.

figures it seems that from 1866 to 1874 there was an increase in the quantities exported, and this increase was fairly steady. In 1875 exports declined and this time there was no rise at all, which meant that after this period the Indian silk trade never recovered its former balance and production came to a minimum. It is astonishing to find that the figures of export still kept fairly steady though at a lower level. This was due to a change in the nature of exports from India. In 1877 Lord Masham succeeded in utilizing the yarn from waste silks, the result of which was greatly appreciated by the silk-producing countries of the world. Exports from India now included large quantities of waste silk, and that is why we have decline in value owing to great difference in price.

Great improvements were made in the processes of production in Japan and in France during the years 1870 to 1880. The production of silk was considered to be a national industry and measures were taken to improve the quality of the raw material. Private and public efforts in these countries led to an enormous increase in the quantity of production. This increase helped France to partly meet the demands of her own market and helped Japan to develop a system of international commerce by exchanging the commodity raw silk with manufactured goods of other nations. Indian industry on the other hand remained in a state of partial decay and demand for Indian silk practically disappeared from the European market except for some special purposes.

The Bengal silk industry lingered on in this condition for a number of years, till in 1899 it was decided to take steps to revive the industry. Since then different measures have been adopted and schemes put forth by the Government and other bodies to improve the local producing conditions and to recommence active operations. A full account of the various methods introduced and suggestions made use of, will be found in Professor Lefroy's Report on Indian Silk, which brings the subject up-to-date.

During recent years, Kashmir has played a very important part in the export trade of Indian silk. The industry itself is of a very long standing, and enjoys an old reputation, but its development and commercial value is of recent origin. When the wave of industrial transition swept over other provinces of India, Kashmir also took up the opportunity of utilizing its labour force to the best advantage of the State as well as the people. Formerly silk was produced and consumed within the boundaries of the State, or sometimes exported to the adjacent countries. The industry was more or less scattered and followed on old indigenous principles, and there was no great benefit from a financial point of view. Export trade was therefore merely

nominal and it was very difficult to realize a good return for the small investments of individual producers.[1]

In 1890 the State took the entire control of the industry in order to establish it on a commercial footing. By 1900 improvements began to show signs of progress, and after long drawn out experimental trials it became known that Kashmir could produce silk on a large scale. The first samples sent over to England received favourable attention from the manufacturers, and after that the State commenced operations on proper business lines, the result of which is shown by the export figures. After the year 1905 the exports of raw silk from India have included large quantities of silk from Kashmir, and as a matter of fact, at present, the bulk of Indian silk used in the European market comes from Kashmir.

A full account of its demand and probable consumption in Europe has been given already, but it may be noted here that if the basis of trade be properly organized, there are great possibilities of increasing the export trade of Kashmir silk to England, France and America. Although modern competition involves the cost of production and standard of quality to a very great extent, yet there are other factors of commercial organization which need a careful study in matters of foreign trade.

The above brief outline of the history of the export trade of Indian silk gives us some interesting and important details, which if carefully studied display an economic and commercial struggle throughout. On the one hand we have the economic factor of competition which plays an important part in the development of trade. This competition means a productive conflict between India and the silk-producing countries of the world. But here we are forced to ask what this competition really means? Did it exist before the eighteenth century when India supplied the demand of the foreign market? If it did exist, as is shown by the relics of the ancient trade, then what makes this competition very prominent now? The answer is quite obvious. In the absence of development in other countries this competition was only nominal, but now it is real and effective, and if this competition is to be a real stimulant to further progress it must have its response in the fast pace of commercial advancement.

On the other hand, we have the important factor of production, which involves the problem of labour and wages. It is not an easy matter to check the flow of labour force from one industry to another under modern conditions. The supply may be abundant, but the rate of wages may be too high to make the industry

[1] For a full historical treatment see *Economies of the Silk Industry* by the author.

pay. And there may be other industries where remuneration may be more than in the silk industry. Under these circumstances, how can we make the problem easier ? Not by stopping production altogether, if other factors of production are favourable, but by introducing new and more economical methods of production, by proper organization and other incentives.

If the problem of competition is solved by low cost of production then the last of these difficulties, that is foreign trade, will be solved by the organization of trade and commerce on the most modern lines. This naturally involves an intimate study of the demand, market conditions, and trade fluctuations, which have been fully discussed in this book.

INDEX

American Silk Association, 128, 144
American Silk Trade :
  Consumption of Silk, 71, 117, 119
  Prices, effect of American demand, 108, 109, 117
  Standardization in, 129
Ardèche Silk Industry, 63
Artificial Silk, 1
  Coventry Trade, 6
  Derby Trade, 6
  French Manufactures, 73
  Increased Consumption, 5, 9
  Prices, effect of competition by, 113
Asiatic Raw Silks, 13
  Defects in, 13
Assam Silk Cultivation, 56 *et seq.*
Aveyron Silk Industry, 63

Bangalore Silk Waste, 45
Basses-Alpes Silkworm Production, 63
Bengal Raw Silks :
  Crêpes and Sewing Silks, suitability for, 30, 31, 32
  Dissatisfaction with, 26, 27
  Early History of Industry, 151 *et seq.*
  French Uses of, 76
  Imports, 15
  Prices, determining, 112
Bengal Waste Silks, 36, 39
Birdwood, Sir George, 146
Bleaching :
  Raw Silks, 23, 76
  Wastes, 38
Bocking Silk Industry, 5
" Boiling-off "—
  English Process, 37
  French Process, 83
  Lyons' Conditioning House Tests, 98, 99
  Weights before and after, Table of, 42
  Yield of various Silks, 45
" Bone " in Silk, 24
Bounties in the French Industry, 65, 71
" Bourrettes," 82
Bradford Industry, 3
Braids and Trimmings :
  Bengal Raws suitable for, 32,
  Derby Trade, 6 [33
  Upholstery, 8, 9
Braintree Silk Industry, 5
Brighouse Silk Industry, 4
British Silk Association, 144
British Silk Industry :
    Artificial Silk, uses of, 1, 5, 6, 9
  Consumption of Raw Silk, 118 *et seq.*
  Distribution System 8, 136
  Imports of Raw, Waste and Thrown Silk, 122
  Indian Supplies for, 8, 11, 136
  Labour Supply, 8
  Raw Silks used in, 13 *et seq.*
  Scattered nature of, 1 *et seq.*
Brokers and Middlemen, 136 *et seq.*
Brucia, White, Imports of, 16
Buying and Selling Arrangements, 134 *et seq.*

Canton Filatures, Standardizing, 129
Canton Raw Silks, 15

Carbonization of Silk Waste, 38, 43
French Practice, 84
Chabrières, Morel and Cie, 76, 93, 120 *note*
Chart of Silk Prices, 117
Chemical Analysis by Lyons' Conditioning House, 100
China Raw Silks :
American Imports, 110, 118
British Market for, 10 , 14
French Consumption of, 79, 118
Packing in " books," 132
Steam Filatures, 15
China Waste Silks :
French Market for, 82
Imports, 11, 36
Tasar, *see* that Title.
" Class " Goods, Raw Silks for, 26
" Classical " and " Extra-Classical " Raws, 13
" Classiques " Frisons, 82
Cleaning Raw Silks :
Cost increased by Defects, 20
India, suggestions for Process, 48
Cleanliness of Waste, effect on Prices, 114
Climatic Conditions, effect on Prices, 107
Cochin China Frisons, 82
Cocoons :
Climatic Conditions and Supply, 107
French Market for, 89 *et seq.*
Grading, 93
Italian, increased output, 64
Prices of, 115
Production in France, 63
Reeling, *see* that title.
Waste from Silkworm Nurseries, 81
Cogolin Silkworm Production, 63, 71, 89
Collecting Stations, Central, 127
Colour in Silk :
French Views on, 76
Raw Silks, 23
Sewing Silks, 32
Commercial Organization, 125 *et seq.*
Conditioning Silk Waste, 38
Charges for, 103
Lyons Bureau de Conditionnement, 96 *et seq.*
Cost of Production :
Bleaching, 23
Elasticity and Tenacity, 21
French Silk Industry, 69
Raw Silks, defects in, 17 *et seq.*, 33, 74
Wages and High Prices for Material, 22
Waste Silk Defects, 37, 42
Coventry Silk Industry, 5
French Thrown Silks, for 66
Crêpes-de-Chine :
Bradford Trade, 3
French, 67
Raw Silks for, 25
Scottish Industry, 7
Yarmouth Industry, 5

" Dead " Silk, 24
Degumming :
French Industry, 70, 76
India, suggestions for Process, 48 *et seq.*
Japanese Degummed Exports, 49
Delivery Prices, 115
Demand and Supply, effect on Prices, 107 *et seq.*
" Demi-classiques " Wastes, 82
Derby Silk Industry, 6
" Discharging," *see* " Boiling-off "
Distribution in the British Trade, 8, 136
Documentary Drafts System, 134
Dressed Silk, Yield of various kinds, 45
' Dressing " Silk, Waste, 39
Drome Silk Industry, 63
Dyeing and Finishing :
British Industry, 3,
Cotton Threads, detection of, 43
Sewing Silks, 32

East India Company, Early History of Silk Trade, 151 *et seq.*

Elasticity of Silk, 21
Lyons' Conditioning House Tests, 99
Embroideries in the French Industry, 67
Embroidery Silks, *see* Sewing Silks
Eri Silk, 11
Cocoons, prices of, 115
French Market for, 87
Qualities and Uses of, 56
European Raw Silks, 13

Filature de la Capelette, 93
French Raw Silks for British Trade, 13
French Silk Industry:
American Imports, 110
Cocoon Production, decline of, 64, 71, 89
Concentrated Nature of, 61 *et seq.*
Consumption of Raw Silk, 118
Consumption of Waste Silk, 71
Cost of Production in, 69
Divisions of, 63
Far East Imports, 64, 70
German Swiss Competition, 72
Imports' and Exports of Raw and Waste Silks, 1911–1915, 123
Indian Raws, uses of, 76
Indian Wastes, Market for, 86
Labour Conditions, 62, 69, 72
Muslins and Fancy Silks, 67
Policy of French Manufacturers, 74
Spinning, 70, 85
"Frisons," 82

Gard Silk Industry, 63
Glasgow Silk Industry, 7
Gloves, *see* Hosiery and Gloves
Grading of Cocoons, 93
Grading of Silk, 14, 125, 126
Gum in Silk:
"Boiling-off," *see* that title
Effect of, 21
French Views on, 75
"Schapping," *see* that title
See also Degumming

Halifax Silk Industry, 4
Hand-loom weaving, 2
Historical Sketch of Indian Silk Trade, 145 *et seq.*
Hosiery and Gloves, 6
Kashmir Silk for, 28

Imports and Exports, Tables, 120, 122, 123
Indian Silk Trade:
British Industry, Indian Raws suitable for, 11, 26 *et seq.*
Commercial Organization of, 125 *et seq.*
Conditioning House advocated, 101 *et seq.*
Control of, 142
Distribution System in Great Britain and France, 136 *et seq.*
Exports of Raw Silk, 16, 120
French Markets, 76, 86
Historical Sketch, 145
Imports of Raw Silks, 1913–14, 101
Prices, Improvements for increasing, 114
Production of Silk, 119, 120
Silk Association for, 144
Tasar Waste Supplies, 51
Wastes, Production of, 121
Inspection of Samples, 133, 134
Insulating Materials, Manufacture of, 7
Italian Cocoons, increased output, 64
Italian Raw Silks:
American Imports, 110
British Market for, 10, 13

Japan Silks:
British Market for, 10
Degummed Waste Exports, 49
Packing in "books," 132
Prices, 112
Waste Silks, 36, 40, 45
Yarns, 4

Kashmir Silks, 27
French Market for, 77
Grading System, 128
History of Trade, 163

Kashmir Silks (*contd.*):
Imports of Kashmir Raws, 16
Prices, determining, 111, 112
Wastes, 36, 45
Knubs, 82, 83

Laces, *see* Ribbons and Ties
" Lacing " of Skeins, 128
Leek Silk Industry, 5
Bengal Raws, demand for, 112
Leek Spun Silk Company, 5
Lefroy, Professor, 54, 119, 163
Leigh Silk Industry, 7
Logère Silk Industry, 63
Lyons Industry, 65
Competition with Foreign Goods, 68
Conditioning House, 96 *et seq.*
Indian Raw Silks used in, 76, 77
Labour Organization, 69

Macclesfield Industry, 2
Marseilles:
Cocoon Imports, 89, 93
Filature Organization, 64, 93
Masham, Lord, 163
Mercerized Cottons, effect on Silk Prices, 113
Mixture Silk Fabrics, 3
Kashmir Raws for, 28
Wool and Tasar, 53
Moisture in Silk:
Effects of, 21
Lyons Conditioning House Tests, 96 *et seq.*
Mourning Crêpes, 4, 29, 30
Muga Silk, 11
French Market for, 87
Qualities and Uses of, 58
Museum at Lyons' Conditioning House, 100
Mysore Raw Silks:
Imports, 16
Prices, 112
Uses for, 28

Nets, 7
Net Silk Industry, 1
Raw Material for, 10
New York Market, Silk Prices, 71
Noils, 82
Norwich Silk Industry, 4
Nottingham Silk Industry, 6

Packing of Silk, 131
Passementerie Trade, 85
Patiala Silks, 79, 80
" Picking " Silk Waste, 38, 43
Piedmont Gum Waste, 36, 45
Plush, *see* Velvets and Plushes
Prices, Determination of, 107 *et seq.*

Quality of Silk, effect on Prices, 111, 114

Raw Silks:
American Imports by Countries, 1906–1913, 110
British Markets for, 13
Colour of, 23
Consumption, determination of, 118, 121
Defects and Cost of Production, 17, 33, 74
Demand and Supply, 107 *et seq.*
French Distribution of, 70
Gum, *see* that title
Indian, *see* Indian Silk Trade
Packing of, 131, 132
Sizes of, 78
Transport Charges, 75, 76
Texture of, 24
Uses in various trades, 25 *et seq.*
Winding, *see* that title
Reeling:
French Industry, 64, 93
Re-Reeling, 14, 131
Ribbons and Ties, 6
St. Etienne Trade, 67, 68
Roe, Sir Thomas, 151

St. Albans Silk Industry, 7
St. Etienne Silk Industry, 65, 67
Workshop System, 69
Schapping:
French Silk Industry, 81 *et seq.*
See also Boiling-off
Scottish Silk Industry, 7, 8
Selling on Commission, 139

Serimetres, 100
Sewing, Knitting and Embroidery Silks, 5
  Raws suitable for, 30
  Tasar, uses of, 53
Shipping Recommendations, 133
Silk Association of America, 128, 144
Silk Pictures, 6
Silk Trade Employers' Association, 3
Sizes of Silks:
  French Silk Industry, 78
  Lack of Uniformity, 20
  Lyons Conditioning House Operations, 99
  Skeins, Standardization of, 125, 126, 128 *et seq.*
South Reddish Silk Industry, 3
Sovie Silk Industry, 63
Spinning Industry:
  French, 70, 85
  Halifax, 4
  Leek, 5
  Waste Silks for, 10, 35 *et seq.*, 45
Standardization of Skeins, 125, 126, 128 *et seq.*
Steam Filatures, 15
Steam Wastes, 82
Stockholding on Market Conditions, 109, 110
Syrian Raw Silks, Imports of, 16

Tapestries, 7
Tarn Silk Industry, 63
Tasar:
  Chinese, French Consumption of, 87 *et seq.*
  Fibre, Nature of, 51
  Indian, increased production of of, 54
  Reeled Tasar, 10
  Spun Tasar, 4
  Schappe Industry, 84
  Wastes, Uses of, 51 *et seq.*
  Yield of, 54
Taunton Silk Industry, 7
Tenacity of Silk, 21
Texture of Raw Silks, 24
Thrown Silks:
  Defective Raws increasing Cost of Throwing, 19
  Determination of Twist, 100
  European Imports for British Trade, 14
  French Industry, 65
  Tension of Thread, 20
Ties and Ribbons:
  Indian Raws suitable for, 29
  St. Etienne Trade, 67, 68
Tiverton Silk Industry, 7
Transport Charges for Raw Silk, 75, 76, 116
Trimmings, *see* Braids and Trimmings
Tsatlees, 14, 26, 33, 132
"Turkey Merchants" in the Early Indian Trade, 155, 156, 157
Tussah, *see* Tasar

Umbrella Silks, 5
Utility of Silk, effect on Prices, 111

Varthema, Ludovico di, 149
Veils:
  Kashmir Raws for, 28
  Nottingham Industry, 6
Velvets, Plushes, etc.:
  British Manufacture, 3, 5
  Eri Silk, use of, 11, 56
  "Hall-mark" of British Spun Yarn, 46
  St. Etienne Trade, 67
  Tasar Waste, use of, 52, 53

Wardle, Messrs. Sir Thomas and Arthur, 5
Waste Silks:
  Bengal Wastes, 36, 39
  British Consumption, 121
  China, *see* that title
  Cocoon Filature Wastes, 82
  Combing from Schappe, 83
  Defects increasing Cost of Production, 37
  Degumming, *see* that title
  "Dressing," 39
  French Consumption, 70
  Imports, 36
  Indian Production, 121 *et seq.*

Waste of Silks (*contd.*):
Japan Wastes, 36, 40, 45
Packing, 133
Prices, determination of, 113
Schapping in France, 81 *et seq.*
Silkworm Nursery Wastes, 81
Spinning, Wastes for, 10, 35 *et seq.*, 45
Tasar, *see* that title
Throwing and Winding, 82
Weaving:
Best Wastes for, 46
Indian Industry, 146
Lyons Industry, 66
Weights of Silk, Lyons' Conditioning Tests, 96 *et seq.*
Wild Silks:
Eri, *see* that title
Indian, French Market for, 87 *et seq.*
Muga, *see* that title
Tasar, *see* that title
Winding:
Canton Filatures, Standardizing, 129
Defective Raws increasing, Cost of, 19, 22
Lyons' Conditioning House Operations, 100

Yarmouth Silk Industry, 4

Printed by P. S. KING & SON, LTD., 2 & 4 Great Smith Street Westminster, S.W.

Digitized with financial assistance from
Hermès India
a project facilitated by the Rotary Club of Bombay

on 10 August, 2018